AVG Automation: Company background

AVG Automation

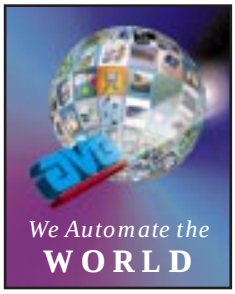
Autotech, a leader in position-based controls, acquired Uticor, the leading message display and operator interface company, in 1995, and combined the two product lines under a new company, named AVG Automation. AVG Automation thus comprised two leading product lines that complemented, as well as enhanced, each other.

AVG Autotech's product line primarily consists of position-based controls. Since introducing the microprocessor-based Programmable Limit Switch (PLS) in 1975, Autotech has consistently led the position-based control market with high performance, innovative products. Over the years, AVG Autotech has been the first to apply micro-processors to PLSs, first to offer back-EMF-based antiplug-ging switches, the first and only company to offer constant torque digital brakes, the first to offer a PLS with ladder logic programming capability, and the first to offer a resolver with integrated electronics. Many of AVG Autotech's products won industry recognition and were featured on prestigious trade magazines' covers.

AVG Uticor's product line primarily consists of message displays and graphical operator interfaces. The standard in Programmable Message Displays (PMDs), Marquees, and Graphical Operator Interfaces, AVG Uticor has a reputation for firsts. AVG Uticor introduced Programmable Operator Interfaces in 1993. In 1996, a *CONTROL ENGINEERING* study named AVG Uticor as the most specified and recognized PMD and Marquee product in industry. In addition, in 1996, AVG Uticor's PGI 100 (PowerPanel) Programmable Graphic Interface won *CONTROL ENGINEERING* Magazine's Product Recognition Award.

AVG—the Autotech Viktron Group

AVG Automation is part of a vertically integrated, diversified, electronics manufacturing conglomerate, called Autotech-Viktron Group(AVG). The group's activities include Printed Circuit Board Manufacturing, Electronic Contract Manufacturing, Semiconductor Marketing, Electronic Component Distribution, and Hybrid Circuit Manufacturing, with 10 manufacturing plants located across the USA.



AVG Automation's Modconnect Products:

Modbus, Modbus Plus, and Remote I/O

Recognizing the popularity and versatility of Modicon's Controllers, AVG Automation produces a variety of products designed to bring its expertise in Motion Control and Operator Interface technologies to Modbus, Modbus Plus, and Modicon Remote I/O systems, as well as to Modicon PLC backplanes. These products add new functionality to popular Modicon controllers.

ModConnect®

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6" LCD Monochrome 100
8" Color 101
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Product Overview

CONTROL Products

Position Sensing & Feedback

Resolvers with Modbus Connectivity:
- RL100-MBP
- RL210-MBP
- RL220-MBP

Resolver Decoder Modules:
- M7350
- M8350

Position-Based Controls (PLS)

PLS-Programmable Limit Switch Modules:
- M7251
- M8251

PLS-Programmable Limit Switch (stand-alone or used in combination with a PLC) Not a module:
- Touch•PLS

Controls for Presses

Die Protection Module:
- M7251

Shut-Height Modules:
- M7350-RSHC
- M7350-RSHI

Tonnage Module:
- M7450

QDNET-010 DeviceNet Scanner:
- DeviceNet & Scanner Module

Human-Machine Interfaces

Character-Based VFD Programmable Message Displays

Master Message Displays:
- PMD 180
- PCI 185
- PMD 370
- PMD 375
- PMD 470
- PMD 475

Slave Message Display
- PMD 180S
- PMD 200S
- PMD 300S

Message Controller (same as master, but without display)
- PMD 180MC
- PMD 370MC
- PMD 375MC

LED Marquees

Numerical Marquee Displays:
- PMD 1404
- PMD 1406

Alphanumeric Master Marquee Display:
- PMD 3170
- PMD 3175

Tricolor Alphanumeric Master Marquee Display:
- PMD 3670
- PMD 3675

Slave Alphanumeric Marquee Display:
- PMD 1100
- PMD 1200
- PMD 1205
- PMD 3000
- PMD 3500

Touchscreen Graphical Operator Interfaces

EL Displays:
- 9" Model

Monochrome LCD
- 5" Model
- 6" Model

Color LCD
- 5" Model
- 8" Model
- 10" Model
- 10" Active Matrix Model
- 10" High-Bright Model

Product Selection Guide

		Part No.	Description	Network: Modbus	Network: Modbus Plus	Network: Modicon S908 800 Series Remote I/O	Backplane: Modicon 984/A120 Compact PLC	Backplane: Modicon TSX Quantum Automation Series	Backplane: Modicon 800 Series I/O	Page
Control	Resolvers	• Position Sensors •								
		RL100-MBP	Single-Turn Resolver, Resolution up to 8192 counts per turn		✔					16
		RL210-MBP	Multi-Turn Resolver, Resolution 1,024 counts per turn, 128 turns		✔					18
		RL220-MBP	Two 1:1 geared single-turn resolvers—one resolver straight out —the other resover provides position data (Resolution 360°) to Modbus Plus Network		✔					20
	PLC Plug-in Modules	• DeviceNet Scanner •								
		QDNET-010	DeviceNet Scanner Module					✔		26
		• Resolver-Decoder •								
		M8350	12-bit single-turn, resolver decoder, fully absolute						✔	24
		M7350-102	10-bit, single-turn resolver decoder, fully absolute				✔	✔		30
		M7350-103	17-bits, multiturn resolver decoder, fully absolute				✔	✔		30
		• Programmable Limit Switch (PLS) • (Includes Brake Wear Monitor Feature)								
		M8251-010	3-digit, 16 PLS outputs, 1 Motion and 1 Fault output						✔	22
		M7251-PLS	3-digit, 16 PLS outputs (8 discrete; 8 through PLC backplane) motion detector, and fault outputs				✔	✔		28
		• Die Protection •								
		M7251-DP	8-die protect inputs				✔	✔		28
		M7251-DPPLS	5-die protect inputs, 7 PLS outputs, motion detector and fault outputs				✔	✔		28
		• Shut Height •								
		M7350-RSHC	Multiturn resolver-based shut-height controller, fully absolute				✔	✔		35
		• Tonnage (Press Load) •								
		M7450	4-channel peak tonnage				✔	✔		38
	Not a Module	• Touch•PLS & Graphical OIs •								
		PL100 (Touch•PLS)	16 output touchscreen PLS and Graphical Operator Interface in one unit— choice of screen sizes (5", 6", or 10")—customizable screens	✔	✔					41

Product Selection Guide (cont.)

		Part No.	Description	Network: Modbus	Network: Modbus Plus	Network: Modicon S908 800 Series Remote I/O	Backplane: Modicon 984/A120 Compact PLC	Backplane: Modicon TSX Quantum Automation Series	Backplane: Modicon 800 Series I/O	Page
Human-Machine Interfaces (HMI)	Vaccuum Flourescent Diplays	**• Master Message Display •**	(Display only—no keypad)							
		PMD 180	2- or 4-line, 20 or 40 characters per line, vacuum fluorescent characters 5 mm high	✔						50
		PMD 370	4-line display with 20 vacuum fluorescent 12.5 mm high characters per line			✔				52
		PMD 375	4-line display with 20 vacuum fluorescent 12.5 mm high characters per line		✔					52
		(Display & keypad - 2-way communication)								
		PCI 185	2- or 4-line, 20 or 40 vacuum fluorescent characters 5 mm high	✔						54
		PCI 185E	2-line, 20 vacuum fluorescent characters 5 mm high	✔						54
		PMD 470	4-line display with 20 vacuum fluorescent 9.1 mm high characters per line			✔				57
		PMD 475	4-line display with 20 vacuum fluorescent 9.1 mm high characters per line		✔					57
		• Slave Message Displays •								
		PMD 180S	2- or 4-line, 20 or 40 characters, vacuum fluorescent characters 5 mm high	For use with all Master Message Displays, Message Controllers, Master Marquees, and PowerPanels						63
		PMD 200S	2-line, 20 characters, vacuum fluorescent characters 11.3 mm high							65
		PMD 300S	4-line, 20 characters per line, vacuum fluorescent characters 12.5 mm high							67
	No display	**• Message Controllers •**								
		PMD 180MC	PMD 180 without display	✔						59
		PMD 370MC	PMD 370 without display			✔				61
		PMD 375MC	PMD 375 without display		✔					61

Continued on page 6

Product Selection Guide (cont.)

		Part No.	Description	Network: Modbus	Network: Modbus Plus	Network: Modicon S908 800 Series Remote I/O	Backplane: Modicon 984/A120 Compact PLC	Backplane: Modicon TSX Quantum Automation Series	Backplane: Modicon 800 Series I/O	Page
Human-Machine Interfaces (HMI cont.)	LED-Based Marquee Displays	• Master Alphanumeric Marquees •								
		PMD 3170	2 to 8 lines, 20 to 80 characters per line, 2 to 8" high, red LEDs			✔				72
		PMD 3175	2 to 8 lines, 20 to 80 characters per line, 2 to 8" high, red LEDs		✔					72
		PMD 3670	2 to 8 lines, 20 to 80 characters per line, 2 to 8" high, red, yellow, and green LEDs			✔				74
		PMD 3675	2 to 8 lines, 20 to 80 characters per line, 2 to 8" high, red, yellow, and green LEDs		✔					74
		• Slave Alphanumeric Marquees •								
		PMD 1100	Stackable, 1 to 8 lines, 20-2" LED characters	For use with all Master Message Displays, Message Controllers, Master Marquees, and PowerPanels						76
		PMD 1200	Stackable, 1 to 8 lines, 20-4" LED characters							78
		PMD 1205	Stackable, 1 to 8 lines, 10-4" LED characters							78
		PMD 3000	2 to 8 lines, 20 to 80 characters per line, 2 to 8" high, red LEDs							80
		PMD 3500	2 to 8 lines, 20 to 80 characters per line, 2 to 8" high, red, yellow, and green LEDs							82
		• Numeric Marquees •								
		PMD 1404	Stackable, 1 to 8 lines, 4-4" seven-segment LED characters	For use with all Master Message Displays, Message Controllers, Master Marquees, and PowerPanels						84
		PMD 1406	Stackable, 1 to 8 lines, 6-4" seven-segment LED characters							84
	PowerPanels	• Touchscreen Graphical OIs •								
		PowerPanel	5", 6", 8", 9", and 10" monochrome and color touchscreen flat panel displays. Powerful graphics programming	✔	✔					92

Control Products Introduction

AVG Automation offers several motion and/or position-based control products that can be connected to and used by Modicon PLCs. The types of motion control products offered are:

General Position-Based Contols—

- **Resolvers**
- **Resolver Decoder Modules**
- **Programmable Limit Switch (PLS) Modules**

Controls for Presses—

- **Press Tonnage Modules**
- **Die Protection Modules**
- **Shut-Height Control Modules**

General Position-Based Controls

Resolvers—A robust, absolute position sensor

Several technologies are available for position sensing in industrial environment. The two most popular devices for sensing rotary position are encoders and resolvers. Resolvers are preferred sensing devices in the industrial environment due to their robustness.

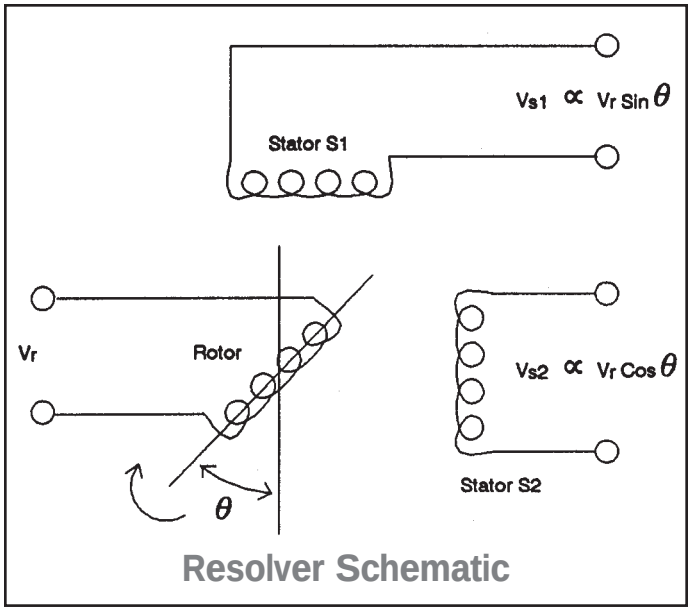
A resolver is a passive position transducer. It works on the principle of a rotary transformer and consists of one rotor winding and two stator windings located 90 degrees apart. The rotor winding is excited with a voltage V_r. As the shaft rotates, the output voltage of the stator windings varies as the sine and cosine of the shaft angle.

$$V_{s1} \propto V_r \sin \text{Ø} \text{ and } V_{s2} \propto V_r \cos$$

The ratio of the secondary stator voltages:

$$\frac{V_{s1}}{V_{s2}} = \frac{V_r \sin \text{Ø}}{V_r \cos \text{Ø}} = \text{Tan Ø; Ø} = \text{Tan}^{-1}\left(\frac{V_{s1}}{V_{s2}}\right)$$

Note that the angle Ø is no longer a function of the induced absolute Vr, but rather the ratio of V_{s1} and V_{s2}. Therefore, variations in the rotor voltage V_r, frequency and temperature are no longer factors in ratiometric output signal V_{s1}/V_{s2}. This results in a highly accurate and repeatable resolver decoder.



Resolver Schematic

Advantages of Resolvers vs. Encoders

The decision of whether to use a resolver or encoder depends entirely on the application. The factor that has the greatest impact on the decision is the operating environment. The environmental integrity of a brushless resolver is unchallenged. Being simple rotary transformers, resolvers can take more abuse than optical encoders.

Resolvers exhibit no significant wear or aging. This is especially important when the operational temperature is below freezing or above 150 °F. Under these extremes, the only choice is to use a resolver. The operating temperature of a typical resolver ranges from -67 °F to +248 °F.

Resolvers also survive in conditions of severe mechanical shock and vibrations, excesses in humidity, oil mists, and exposure to coolants and solvents.

Resolvers on Modbus Plus

Many machine control systems utilize Modicon PLC's as controllers. These controllers require machine position feedback continuously. With a resolver as position sensor, 'till now, the control designer had two choices:

- Use a stand-alone resolver-decoder and get digital position back to PLC through a discrete input card,
- Use a PLC Plug-in resolver decoder card.

In addition to offering stand-alone decoders as well as plug-in modules for Modicon PLCs, AVG now introduces a third option—Resolvers with built-in Modbus connectivity. This option allows users to wire the resolver directly into the Modbus plus network, making wiring of the control system standard, and therefore simpler and cost effective. In addition, the Resolver position information is available to all devices on the network.

AVG Autotech's Modbus Plus resolvers come in NEMA 13-rated housings for protection against water mist, oil, and dust.

Continued on page 8

Control Products Introduction (cont.)

Resolver Decoder Modules

When used in conjunction with an AVG Automation single-turn resolver, a resolver decoder provides position information in digital format. For high noise immunity, AVG's resolver decoders utilize the ratiometric resolver-to-digital conversion technique. AVG decoder products are offered as stand-alone (not covered in this catalog) or as PLC plug-in modules. Most products offer programmable resolution; allowing you to select the resolution that meets your needs. The programmable zero offset feature allows you to mount the resolver without any concern for the resolver zero and machine zero alignments.

Currently, AVG offers the following PLC plug-in resolver decoder modules for Modicon PLCs.

Modicon PLC	Resolver Decoder Module
984 Compact	M7350
TSX Quantum	M7350
800 I/O	M8350

Programmable Limit Switch (PLS) Modules

A Programmable Limit Switch (PLS), in conjunction with a revolver, replaces rotary cam limit switches. The PLS decodes resolver signals to get the machine position, and controls several outputs based on user-programmed setpoints.

The PLS offers many advantages over an electromechanical cam switch. The most important of all is the user's ability to fine-tune the setpoints in a PLS without stopping the machine. In addition, the PLS offers more accurate operation as well as features, such as speed compensation, which are not possible with the electromechanical cams.

Although, the PLS function may be performed by a PLC in ladder logic, a PLS offers highly repeatable outputs, compared to a PLC, because of scan-time variations.

A PLS typically is used to provide timing signals for a variety of automation functions. In addition, a PLS provides position and/or RPM data.

Some of the features of AVG PLSs are as follows:

- Optically isolated outputs
- Programmable resolution and zero offset
- Fine-tune-in-motion allows you to modify dwells without stopping the machine
- Individual speed compensation (for each channel) for compensating device response time
- Multiple dwells for each channel
- Each channel can be used either as Angle ON—Angle OFF, or as Angle ON—Time OFF
- An Angle On—Time OFF channel turns ON outputs at an angle for programmed time
- Built-in Brake Monitor and Motion Detect features

AVG offers a variety of PLS models to suit different application needs. For Modicon platforms, AVG offers PLC-Plug-in modules as well as a touchscreen-based product called Touch•PLS.

Modicon Platform	PLS Modules	DPPLS Modules
984 Compact	M7251	M7251
TSX Quantum	M7251	M7251
800 I/O	M8251	

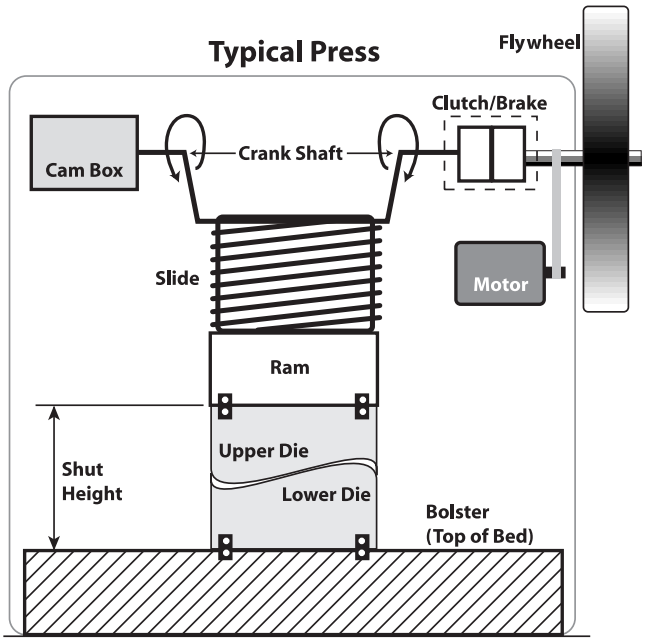
Touchscreen-based PLS (not a module)
Modbus, Modbus Plus Touch•PLS

Controls for Presses

The illustration defines the major components of a typical mechanical stamping press. The motor/flywheel combination drives the crankshaft, which causes vertical movement of the ram. The material to be stamped is placed between the two die halves. The bottom half of the die is bolted to the bolster, while the top half is mounted to the ram. The part is formed/stamped when the two die halves come in contact with the material and press it.

Modern electronic controls help increase press productivity, improve part quality, and protect costly dies and presses from damage. AVG Automation offers several such control modules, which can be used by Modicon PLCs, including:

Modicon PLC	984 Compact	TSX Quantum
Press Tonnage	M7450	M7450
Die Protection	M7251-DPPLS	M7251-DPPLS
Shut-Height Control	M7350-RSHC	M7350-RSHC



Press Tonnage Modules — Peak and Signature Modules

The press industry has long recognizing the benefits of load monitoring. The peak monitor module protects press from over and under tonnage, while the signature module acquires the tonnage and compares it to be within programmed limits from a reference signature curve. The reference signatures are learned by the module while few good parts are stamped. The Signature module can, in addition to protecting press from over tonnage, protect dies and ensure quality of stamped parts.

The AVG Automation tonnage modules, unlike other load monitors, use tonnage sensors with built-in current amplifiers to give a 4-20 mA output instead of the usual microvolt-level output. With a current-loop output, wiring the sensors to the monitor is more robust and resistant to press floor electrical noise.

The AVG Autotech load monitor has the following features:

- 2- to 4-load sensor inputs, with 4-20 mA output
- Peak module protects press from over/under tonnage
- Signature module protects press and dies, and detects bad quality parts
- Total and Good Parts counter

Die Protection Modules

The Die Protection Module helps protect expensive dies by ensuring proper material progression throughout the press stroke. Appropriately located sensors (proximity, photo-electric, etc.) can monitor material progression. The module checks sensors constantly for programmed events during programmed dwells. The AVG Automation die protection module can monitor up to 13 sensor inputs.

Following are the Die Protection features of AVG Automation's Modules:

- Optically isolated sensor inputs
- Programmable sensor events, such as Sensor Low, Sensor High, Rising Edge, Falling Edge, Pulse
- Programmable multiple dwells for monitoring of sensors
- Programmable sensor names allow you to refer sensors by their functions, such as Feed, Eject, etc.
- Built-in sensor integrity check ensures that the sensors are functional
- Each sensor fault can be independently associated with either E-Stop output or with T-Stop output
- 4 Counters—batch, quality, tool, and total

Shut-Height Control Modules

The Shut-Height Control modules use a dual-resolver as shut-height position sensor. The indication module decodes position, scales it, and displays in engineering units. The control module, in addition to indication functions, also adjusts the shut-height automatically. Shut-Height modules from AVG Automation are very easy to calibrate and use. The calibration is as simple as moving a ram to two different positions and entering corresponding shut-height values in the unit.

The AVG Automation Shut-Height Modules have the following features:

- Dual-resolver-based
- Extremely easy to calibrate
- Precise shut-height indication
- Automatic shut-height adjustment (control modules)
- Drift monitoring feature ensures that shut-height is within user programmable drift
- Programmable Upper and Lower Travel Limits to keep press ram movement within OEM travel limits.

Resolvers

Robust Rotary Position Transducers

Features:

- **Absolute Shaft Position**
- **No Internal Electronics**
- **Brushless Resolver Design**
- **Single- and Multi-turn Models Available**
- **High Resistance to Shock and Vibration**
- **Broad Temperature Range -67 to +248 °F (-55 to +120 °C)**
- **Remote Ratiometric resolver decoder provides highly noise immune encoder**
- **Choice of heavy duty, medium duty, and explosion-proof FM approved housings**

The resolver is a highly accurate and highly dependable device for absolute position shaft encoding. Resolvers have a reliable track record of applications in aerospace, military, and industry, where they have been used for decades for position sensing. Some of the common applications are radar antenna position sensing, missile guidance systems, NC machine position feedback, automotive stamping presses 2-piece can manufacturing presses, and packaging machines. The resolver is designed to operate reliably under extremely hostile environments, such as continuous mechanical shock, vibration, extreme temperature and humidity changes, oil mist, coolants, and solvents.

The resolver is a passive transducer. It's a brushless rotary transformer with one rotor and two stator windings. The stator windings are electrically 90° out-of-phase with each other. As the shaft rotates, the relative position of the rotor and the stator windings change. Either the rotor or the two stator windings together can be used as the primary of the rotary transformer and the secondary will then produce an analog voltage corresponding to the shaft position.

RL100-Workhorse of the Industry

AVG Autotech's RL100 resolver is the most rugged resolver in the industry today. AVG Autotech has over 50,000 of these resolvers operating with extreme reliability in highly demanding applications in automotive, can manufacturing, and packaging industries. Rugged industrial housing, heavy-duty double-row ball bearings and an internal flexible coupling lend to an extremely reliable design.

Single-Turn Resolvers

Single-Turn Resolvers (RL100, E6R-, and E7R- models) contain a single resolver and no gearing. The internal resolver is coupled directly to the external shaft.

For your local AVG Automation Distributor or Technical Support inside the U.S. call: 1-800-TEC-ENGR.

ModConnect®

AVG is proud to be a Modconnect Partner

Resolvers (cont.)

Built-in Gear Train for Multi-Turn Applications

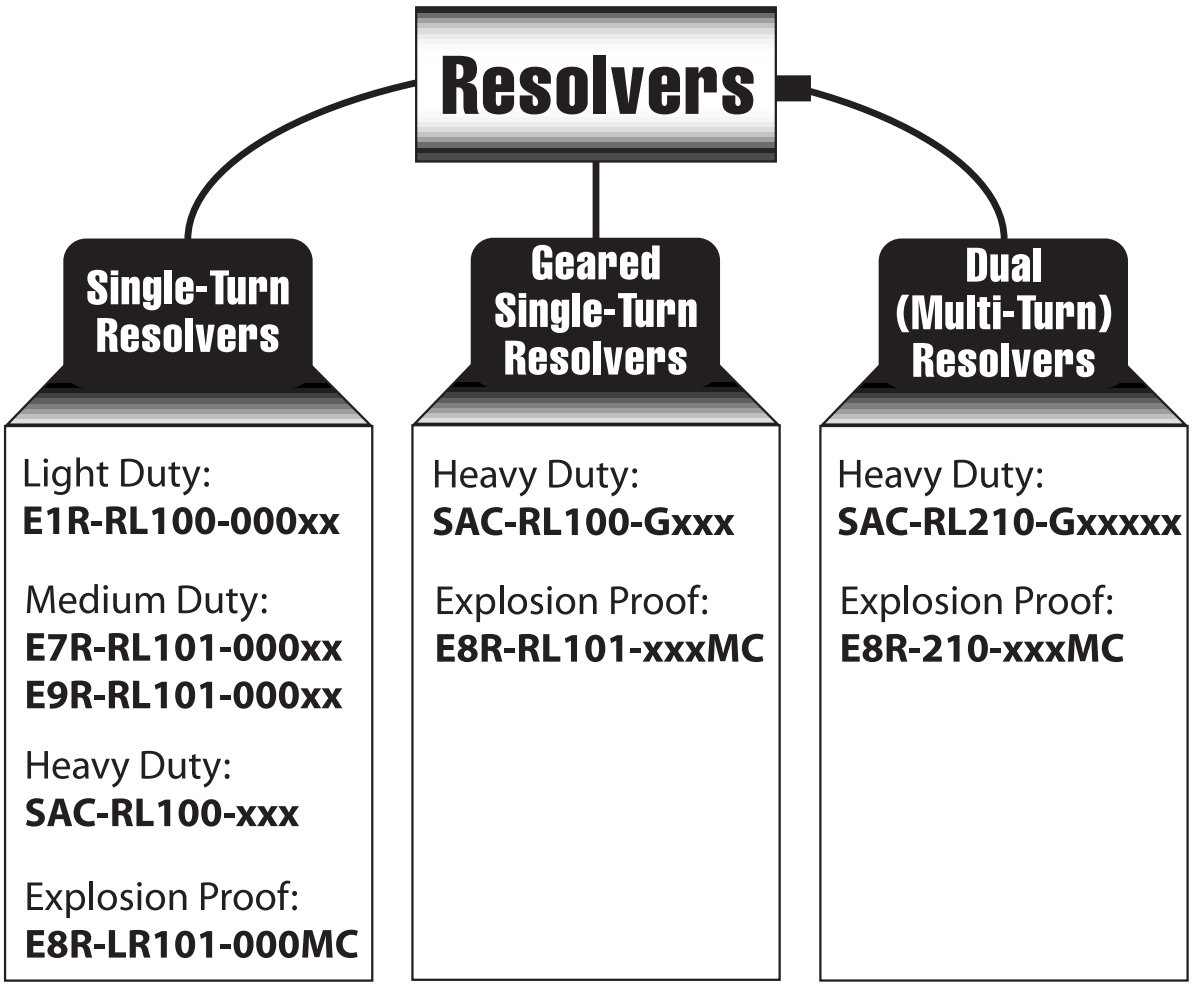
Geared Single-Turn Resolvers (SAC-RL100-Gxxxx and E8R-RL101-xxxMC) are offered with built-in gear trains that can be specified in over 15 gear ratios (ranging from 2:1 to 100:1). With a gear train, the resolver makes one turn for many turns of the input shaft (A 2:1 gear ratio means the external shaft has to turn twice to turn the resolver's shaft once. A 100:1 ratio means the external shaft has to turn 100 times for the resolver shaft to turn once.). This feature is especially useful in those applications where the resolver's rotation is being used to indicate linear motion.

Dual (Multiturn) Resolvers

A Dual (multiturn) Resolver (SAC-RL210-Gxxxx and E8R-RL210-xxxMC) comprises two resolvers coupled to each other through a gear train (standard ratios offered are either 64:1 or 128:1). One of the resolvers is called the "fine" resolver and is coupled to the machine shaft in such a way that it turns at the same RPM as the machine. The other resolver is called the "coarse" resolver is geared down by the gear ratio used. As the shaft of the dual (multiturn) resolver turns, the coarse resolver keeps track of the number of revolutions and the fine resolver keeps track of the shaft position in each revolution. Thus, the combination of the resolver signals yields absolute machine position. To eliminate backlash-induced errors, the dual resolver employs an antibacklash gear.

FM Approved Explosion-Proof Design for Safety

Explosion-Proof Resolvers (E8R-RL101-xxxMC and E8R-RL210-xxxMC) are designed to prevent or control explosive situations with brute force. AVG Automation uses heavy enclosures designed to hold an explosion within the housing. Resolvers with an explosion-proof using can operate at normal power levels in hazardous environments. Even under fault conditions, an explosion or fire may not occur because there simply isn't enough air within the sealed housing to support combustion. Should an explosion occur, the housing is strong enough to contain it.



Resolvers (cont.)

Resolvers Specifications

ELECTRICAL:

Frequency:	2.250 kHz
Input Voltage:	1.88 V
Input Current:	6 mA
Input Power:	6.5 mW
Rotor Impedance with Stator Open Circuit Zro:	180 + j256 Ω
DC Resistance (Rotor):	18.3 Ω
Output Voltage (Stator):	2.63 V ±5%
Transformation Ratio:	1.400

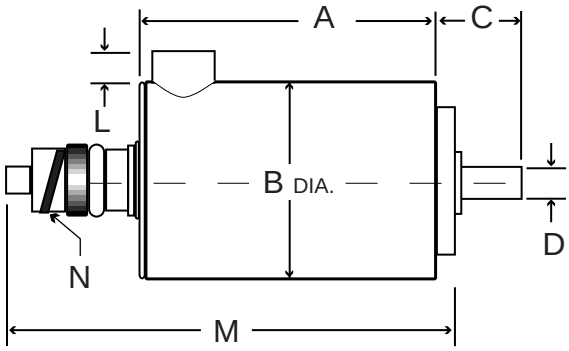
SPECIFICATIONS:		Single Resolver				Dual Resolver	
	Part Number Serries	SAC-RL100-xxx SAC-RL100-Gxxx x	E8R-RL101-xxxMC	E9R-RL101-000 x x E7R-RL101-000 x x	E1R-RL101-000 x x	SAS-RL210-Gxxx x	E8R-RL210-xxx MC
	Service	Heavy-Duty	Explosion-Proof Heavy-Duty	Medium-Duty	Light-Duty	Heavy-Duty	Explosion-Proof Heavy-Duty
MECHANICAL							
Housing	Size	40		25		40	
	in. dia.	4.0		2.5		4.0	
	(mm) dia.	(101.6)		(63.5)		(101.6)	
	Material	Metal		E9—Plastic E7—Metal	Plastic	Metal	
Shaft Size	inches	5/8		3/8		5/8	
	(mm)	(15.9)		(9.53)		(15.9)	
Maximum Shaft Loading	Axial lb.	50		40		50	
	Radial lb.	100		36	6	100	
Max. Starting Torque	oz/in.	8		5		8	
	(gm/cm)	(576.1)		(360.1)		(576.1)	
Moment of Inertia	oz/in.2	10.16					
	(gm/cm2)	(45)					
Max. Slew Speed	RPM	5,000					
Bearing Life at Max. Mfr. Spec.	Rev.	2×10^9		2×10^8		2×10^9	
Weight	lb.	6	8	1		6	8
	(kg)	(2.72)	(3.63)	(0.454)		(2.72)	(3.63)
ENVIRONMENTAL							
Shock	g for 11 msec.	200					
Vibration	g to 2,000 Hz	20					
Operating Temperature	°F	-67 to +248					
	(°C)	(-55 to +120)					
Storage Temperature	°F	-85 to +302					
	(°C)	(-65 to +150)					

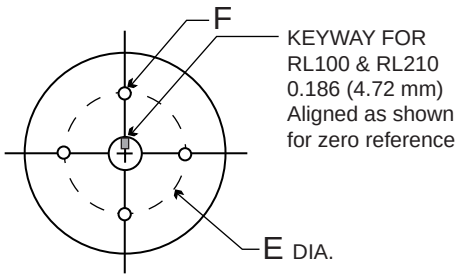
Resolvers (cont.)

Mounting Dimensions

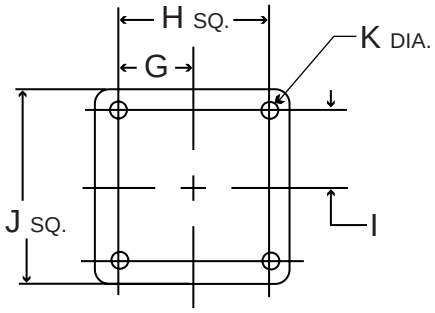
Resolver Mounting Table

Resolver Part Number:	SAC-RL100-XXX SAC-RL100-GXXX X	E8R-RL101-XXXMC E8R-RL210-XXXMC	SAS-RL210-GXXX X	E1R-RL101-000 X X	E7R-RL101-00 X X	E9R-RL101-000 X X
MEASUREMENTS						
A	5.50 (139.7)	8.56 (217.5)	6.50 (165.1)	3.57 (90.7)	3.87 (98.3)	3.57 (90.7)
B (dia.)	4.0 (101.6)			2.50 (63.5)		
C **Servo Mount**	1.25 (31.8)			1.18 (30.0)		
C **Flange Mount**	—			1.06 (26.8)	1.18 (30.0)	1.06 (26.8)
D (dia.)	0.63 (15.9)			0.38 (9.5)		
E (dia.)	2.50 (63.5)			—	2.00 (63.5)	—
F	10-32 UNF			—	4-40 UNC	—
G	—			1.03 (26.2)		
H (sq.)	—			2.06 (52.3)		
I	—			1.33 (33.8)		
J (sq.)	—			2.66 (67.6)	2.65 (67.3)	2.66 (67.6)
K	—			0.22 (5.54)		
L	0.625 (15.9)			—		
M	7.60 (193.0)	—	8.60 (218.4)	—	5.98 (151.8)	—
N	*	—	*	—	*	—





Servo Mount



Flange Mount

* MS-CONNECTORS
MS3116F-12-10S
MS3112F-12-10P

How to Order

— Single Resolver —

Heavy Duty:

SAC-RL100-xxx — Single-Turn, Size 40, NEMA 13, 5/8" Shaft

xxx =
- **010** Terminal Block Wiring
- **M11** MS Connector
- **M19** 19-Pin MS Connector on Side

Substitute **0** in **SAC-RL100-xxx** with **2** for higher accuracy
For NEMA 4, substitute **C** in **SAC-RL100-xxx** with **NE4**

Heavy Duty Geared Single Turn:

SAC-RL100-Gxxx x (1 2) — Geared Single-Turn Size 40, NEMA 13, 5/8" Shaft

1: xxx = **Gear Ratio** 002, 003, 004, 008, 012, 016, 020, 024, 032, 036, 040, 048, 060, 064, 080, 100

2: x = Connector
- **Blank** Terminal Block Wiring
- **M** MS Connector

Substitute **0** in **SAC-RL100-xxx** with **2** for higher accuracy
For NEMA 4, substitute **C** in **SAC-RL100-xxx** with **NE4**

Heavy Duty Explosion-Proof:

E8R-RL101-000MC — Explosion-Proof, Size 40, 5/8" Shaft

Substitute **1** in **SAC-RL101-000MC** with **2** for higher accuracy

Heavy Duty Geared Single Turn Explosion-Proof:

E8R-RL101-xxxMC (1) — Explosion-Proof, Size 40, 5/8" Shaft

1: xxx = **Gear Ratio** 002, 003, 004, 008, 012, 016, 020, 024, 032, 036, 040, 048, 060, 064, 080, 100

Substitute **1** in **SAC-RL101-xxxMC** with **2** for higher accuracy

Medium Duty:

E9R-RL101-000 x x (1 2) — Size 25, Single-Turn, NEMA 4X, MS Connector, Engineered Plastic Housing

1: x = Mounting:
- **F** Flange Mount
- **S** Servo Mount

2: x = Connector Position:
- **E** Back End
- **S** Side

Substitute **1** in **E1R-RL101-000xx** with **2** for higher accuracy

E7R-RL101-000 x x (1 2) — Size 25, Single-Turn, NEMA 13, MS Connector, Metal Housing

1: x = Mounting:
- **F** Flange Mount
- **S** Servo Mount

2: x = Connector Position:
- **E** Back End
- **S** Side

Substitute **1** in **E7R-RL101-000xx** with **2** for higher accuracy
For NEMA 4, substitute **000** in **E7R-RL100-000xx** with **NE4**

Light Duty:

E1R-RL101-000 x x (1 2) — Size 25, Single-Turn, NEMA 13, MS Connector, Engineered Plastic Housing

1: x = Mounting:
- **F** Flange Mount
- **S** Servo Mount

2: x = Connector Position:
- **E** Back End
- **S** Side

Must use CPL-003/8-3/8 external flexible coupling (3/8" to 3/8")
Substitute **1** in **E1R-RL101-000xx** with **2** for higher accuracy

How to Order

— Dual Resolver —

Heavy Duty:

SAC-RL210-G<u>xxx</u> <u>x</u> (1 2) — Geared Single-Turn Size 40, NEMA 13, 5/8" Shaft

1: <u>xxx</u> = **Gear Ratio** 004, 008, 016, 032, 064, 128

2: <u>x</u> = Connector **Blank** Terminal Block Wiring
M MS Connector

For NEMA 4, substitute C in SAC-RL210-Gxxx x with 4

Heavy Duty Explosion-Proof:

E8R-RL210-<u>xxx</u>MC — Geared Single-Turn Size 40, NEMA 13, 5/8" Shaft

<u>xxx</u> = **Gear Ratio** 064, 128

— Accessories —

Cables:

CBL-10T22-<u>x</u> <u>xxx</u> (1 2) — 22 AWG, 10 conductor (5 twisted pairs) overall foil shielded cable

1: <u>x</u> = **C** Without connector
M 10-Pin MS Connector

2: <u>xxx</u> = Length in ft. 010, 020, 050, and increments of 50 ft., i.e., 100, 150, etc.

CBL-RL210-<u>x</u> <u>xxx</u> (1 2) — 22 AWG, 10 conductor (5 twisted pairs) overall foil shielded cable

1: <u>x</u> = **M** 19-Pin MS Connector for use with dual resolvers
S For use with SAC-RL100-M19

2: <u>xxx</u> = Length in ft. 010, 020, 050, and increments of 50 ft., i.e., 100, 150, etc.

External Couplings:

CPL-003/8-3/8 — 3/8” to 3/8” flexible coupling

CPL-005/8-5/8 — 5/8” to 5/8” flexible coupling

Mating Connector:

ECM-10REC-ITT — 10-Pin mating MS Connector for Single-Turn Resolvers with MS Connector (MS 3116F-12-10S)

ECM-10REC-ITT90 — 90° 10-Pin mating MS Connector for Single-Turn Resolvers with MS Connector

ECM-19REC-ITT — 19-Pin mating MS Connector for Single-Turn Resolvers with MS Connector (MS 3116F-12-10S)

ECM-19REC-ITT90 — 90° 19-Pin mating MS Connector for Single-Turn Resolvers with MS Connector

EPM-10PIN-ITT — 10-Pin Male MS Connector for Single-Turn Resolvers with MS Connector (MS 3112E-12-10P)

EPM-19PIN-ITT — 19-Pin Male MS Connector for Single-Turn Resolvers with MS Connector (MS 3112E-12-10P)

Mounting Bracket:

MMB-EN359-010 — Mounting Bracket for use with Size 40 and Size 25 Resolvers

RL100-MBP Series
Modbus Plus Resolver

Single-turn Resolver with built-in Modbus Plus connectivity

Features:

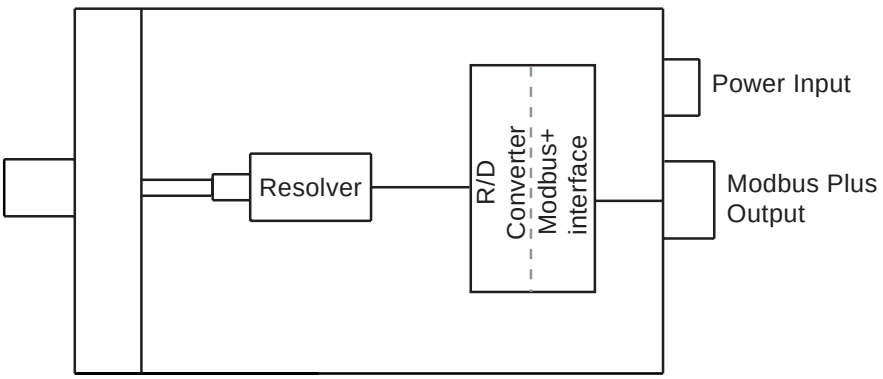
- **Robust transducers provide Absolute Shaft Position: No loss of position if the machine moves during power outage**
- **Up to 8192 counts per turn resolution**
- **Position on Modbus Plus network available in node's registers as well as in node's global data**
- **High resistance to shock and vibration**
- **NEMA 13 housing provides protection against water mist, oil and dust**
- **Broad temperature range, 32 to 140 °F (0 to 60 °C)**

The resolver is a highly accurate and highly dependable device for absolute position shaft encoding. Resolvers have a reliable track record of applications in aerospace, military, and industrial applications, where they have been used for decades for position sensing. Typical applications include packaging machines and machine tools. Resolvers are designed to operate reliably under extremely hostile environments, such as continuous mechanical shock, vibration, extreme temperature and humidity changes, and/or exposure to oil mists, coolants, or solvents.

AVG-Autotech's RL100-MBP resolver is internally decoded using a noise-immune ratiometric converter. The decoded position is brought out using a standard 9-pin D connector for direct connection to a Modbus Plus network. The position is available in the node's registers as well as in node's global data. Models are available with resolution up to 8192 counts per turn.

Application:

The RL100-MBP is an ideal product for machines requiring an absolute position input to Modicon controllers, such as the A120, Quantum, Momentum, etc. The resolver, coupled to the machine shaft provides shaft angle values on a Modbus Plus network, broadcast as global data. The shaft position thus is available to all devices on the network.



RL100 - MBP

For your local AVG Automation Distributor or Technical Support inside the U.S. call: 1-800-TEC-ENGR.

ModConnect®

AVG is proud to be a Modconnect Partner

RL100-MBP Series Modbus Plus Resolver (cont.)

Specifications

ELECTRICAL

POWER INPUT:

Voltage range: . . . . . 10-30 VDC

Input current (max.): . . . . . 300 mA

Connectors (on rear):

- **Modbus Plus interface:**
  9-pin D connector
- **24 VDC input power:**
  6-pin connector

MECHANICAL

Housing size:
Size 40—4.0" (101.6 mm) dia.

Max. Starting Torque:
8oz-in (576.1 gm/cm) @ 77 °F (25 °C)

Moment of Inertia (gm/cm^2): 45

Max. Slew Speed (rpm): 5,000

Shaft size: . . . . . .5/8" (15.9 mm)

Max. Shaft Loading:

- **Axial:** . . . . . 50 lb. (22.7 kg.)
- **Radial:** . . . . . 100 lb. (45.4 kg.)

Bearing life at Max. Mfr. Spec. (Rev.):
2 x 10^9

Approx. Weight: . . . . . 6.5 lb. (2.95 kg.)

ENVIRONMENTAL

Shock: . . . . . 200 g for 11 msec

Vibration: . . . . . 20 g to 2,000 Hz

Temperature:

Operating:
32 to 140 °F (0 to 60 °C)

Storage:
-40 to +185 °F (-40 to 85 °C)

Enclosure: . . . . . NEMA 13

Modbus Plus Interface:

Direction of increasing counts:
CW/CCW, DIP switch selectable

Resolution:
Up to 8192 counts per turn, factory ordered

Resolver Data Format: . . . . . Binary

Node Address:
1-64
(Set using internal DIP switches)

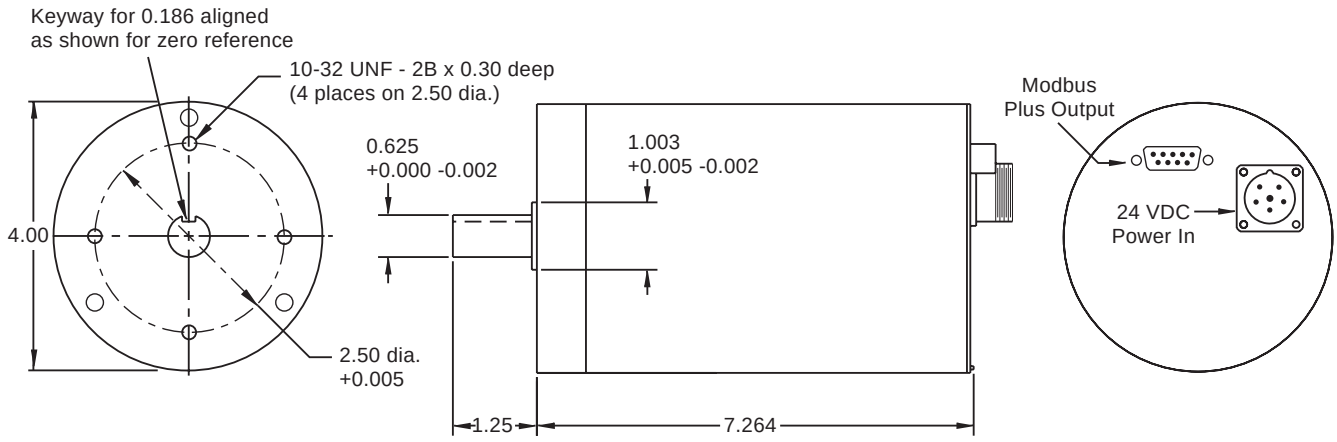
Modbus Plus Connector:
Standard pinout 9-pin D connector

Node Data:
Position & Status available in node registers as well as broadcast as global data. (See table below)

Node Data:

Data:	Register:	Global Data:
Position	40001	Word 1
Always 0	40002	Word 2
Status*	40003	Word 3

* Status word: Lower Byte—Revision
Upper byte—Type Code (1 for RL100-MBP).



How to Order

SAC-RL100-MBP
Single-turn, 360° resolution, binary output resolver

SAC-RL100-MBPA
Single-turn, 10-bit resolution, binary output resolver

SAC-RL100-MBPB
Single-turn, 12-bit resolution, binary output resolver

SAC-RL100-MBPC
Single-turn, 13-bit resolution, binary output resolver

RL210-MBP
Modbus Plus Multiturn Resolver

Robust and noise-immune rotary position transducers with built-in Modbus Plus connectivity

Ideal for Linear applications such as Shut-Height Measurement and Control

Features:

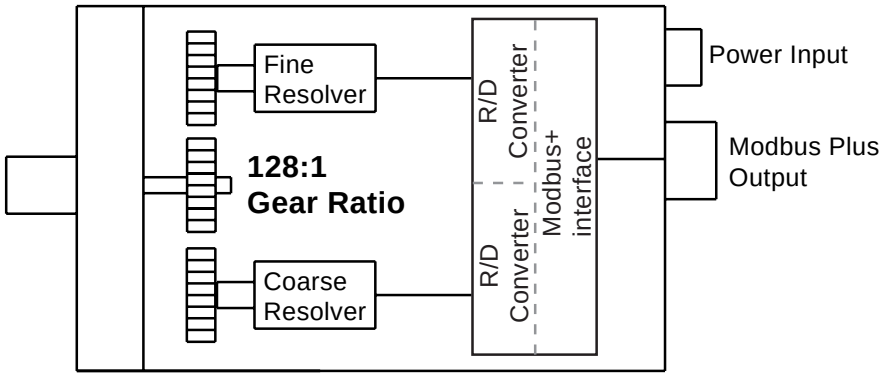
- **Dual-geared resolver provide Absolute Shaft Position over up to 128 turns of shaft**
- **Ideal position transducer for linear applications such as press shut-height measurement and control**
- **Built-in Modbus Plus Connections**
- **Up to 17-bit resolution-128 turns, 1,024 counts per turn**
- **High resistance to shock and vibration**
- **NEMA 13 housing provides protection against water mist, oil, and dust**
- **Broad temperature range, 32 to 140 °F (0 to 60 °C)**

AVG-Autotech's RL210-MBP resolver consists of two resolvers in one housing and coupled together by a gear train. The two together provide absolute position over up to 128 turns (equal to the gearing between the two) of the resolver shaft. This makes the RL210-MBP and ideal position sensor for shut-height type applications, where shut height adjustment motor makes several turns over the ram travel and, yet it is desirable to have absolute measurement of the shut-height.

Resolvers have a reliable track record of applications in aerospace, military, and industrial applications, where they have been used for decades for position sensing.

Resolvers are designed to operate reliably under extremely hostile environments, such as continuous mechanical shock, vibration, extreme temperature and humidity changes, and/or exposure to oil mists, coolants, or solvents.

The 17-bit position data is encoded into binary format and is passed to a Modbus Plus subsystem within the resolver. The data can then be accessed by a Modbus Plus master device over the Modbus Plus network.



RL210 - MBP

For your local AVG Automation Distributor or Technical Support inside the U.S. call: 1-800-TEC-ENGR.

ModConnect®

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RL210-MBP Modbus Plus Multiturn Resolver (cont.)

Specifications

ELECTRICAL

Power Input:
Voltage range: . . . . . 10-30 VDC
Input current (max.): . . . . . 450 mA
Connectors (on rear):
Modbus Plus Interface:
9-pin D connector
24 VDC input power:
6-pin connector

MECHANICAL

Housing size:
Size 40—4.0"(101.6 mm) dia.
Max. Starting Torque:
8 oz-in (576.1 gm/cm) @ 77 °F (25 °C)
Moment of Inertia (gm/cm^2): 45
Max. Slew Speed (rpm): 5,000
Shaft size: . . . . . 5/8" (15.9 mm)
Max. Shaft Loading:
• **Axial:** . . . . . 50 lb. (22.7 kg.)
• **Radial:** . . . . . 100 lb. (45.4 kg.)
Bearing life at Max. Mfr. Spec. (Rev.):
2 x 10^9
Approx. Weight: . . . . . 8 lb. (3.63 kg.)

ENVIRONMENTAL

Shock: . . . . . 200 g for 11 msec
Vibration: . . . . . 20 g to 2,000 Hz
Temperature:
• **Operating:**
32 to 140 °F (0 to 60 °C)
• **Storage:**
-40 to +185 °F (-40 to +85 °C)
Enclosure: . . . . . NEMA 13

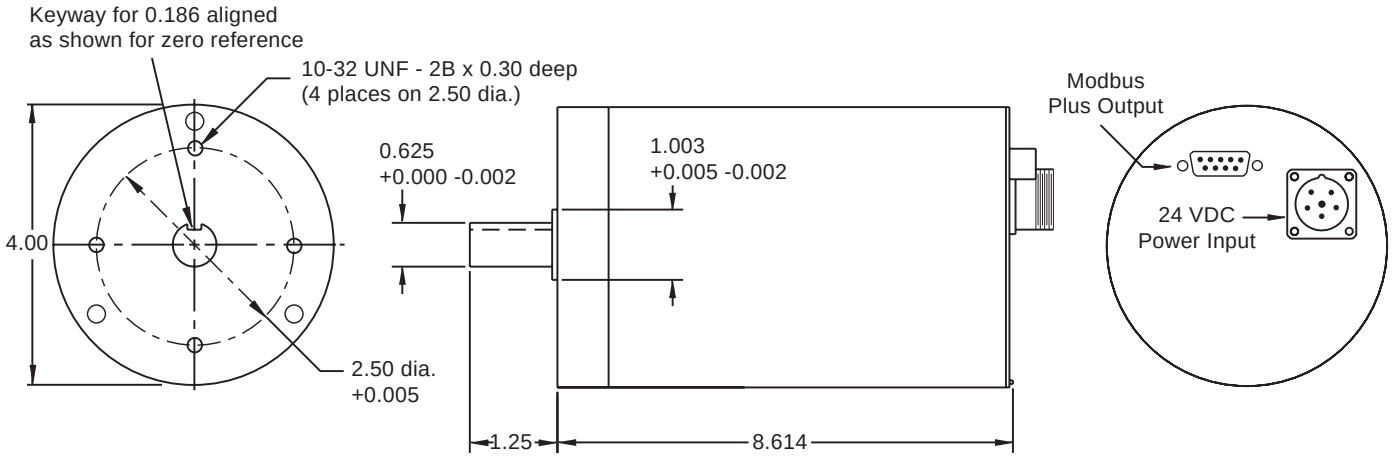
Modbus Plus Interface:

Direction of increasing counts:
CW/CCW, DIP switch selectable
Resolution:
128 turns; 1,024 counts /turn
Resolver Data Format:
Binary format (range 0-131071)
Node Address:
1-64
(Set using internal DIP switches)
Modbus Plus Connector:
Standard pinout 9-pin D connector
Node Data:
Position & Status available in node registers as well as broadcast as global data. (See table below)

Node Data:

Data:	Register:	Global Data:
Lower 16 bits of Position	40001	Word 1
17th bit of Position	40002	Word 2
Status*	40003	Word 3

* Status word: Lower Byte—Revision
Upper byte—Type Code (2 for RL210-MBP).



How to Order

SAC-RL210-MBP
Multiturn resolver, with Modbus connectivity

RL220-MBP
Modbus Plus Dual-Resolver

Two Resolvers in one housing, one with built-in Modbus Plus connectivity

Ideal for Modbus Plus-based Press Automation and Control Systems

Features:

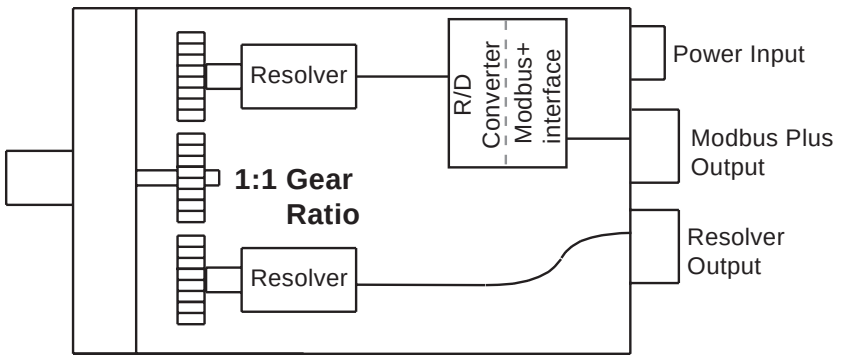
- **Robust transducers provide Absolute Shaft Position**
- **Two Brushless Resolvers, each tracking input shaft**
- **Standard Resolver as well as Modbus Plus connection**
- **Position on Modbus Plus network available in node registers as well as in node's global data**
- **High resistance to shock and vibration**
- **NEMA 13 housing provides protection against water mist, oil, and dust**
- **Broad temperature range, 32 to 140 °F (0 to 60 °C)**

AVG-Autotech's RL220-MBP resolver provides two resolvers in one housing. Both resolvers track the input shaft (1:1 geared to input shaft). Signals from one of the resolvers are brought out on Autotech's standard 10-pin MS connector. The other resolver is internally decoded using a noise-immune ratiometric converter. The decoded position is brought out using a standard 9-pin D connector for direct connection to a Modbus Plus network. The position is available in the node's registers as well as in node's global data.

The resolver is a highly accurate and highly dependable device for absolute position shaft encoding. Resolvers have a reliable track record of applications in aerospace, military, and industrial applications, where they have been used for decades for position sensing. Typical applications include packaging machines and machine tools. Resolvers are designed to operate reliably under extremely hostile environments, such as continuous mechanical shock, vibration, extreme temperature and humidity changes, and/or exposure to oil mists, coolants, or solvents.

Application:

The RL220-MBP is an ideal product for mechanical stamping presses that are controlled by Modicon controllers, such as the A120, Quantum, Momentum, etc. The resolver is coupled to the press crank providing crank angle values on a Modbus Plus network, broadcast as global data (scaled to 360 degrees per revolution). The crank position thus is available to all devices on the network. The other resolver may be used by a clutch-brake control or by any other control requiring standard resolver signals.



RL220-MBP

For your local AVG Automation Distributor or Technical Support inside the U.S. call: 1-800-TEC-ENGR.

ModConnect®

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RL220-MBP Modbus Plus Dual-Resolver (cont.)

Specifications

ELECTRICAL

Power Input:
Voltage range: . . . . . 10-30 VDC
Input current (max.): . . . . . 300 mA
Resolver output characteristics:
Rotor impedance with stator open circuit Zro: . . . . . 70 + j115 ohms
DC resistance (Rotor): . . . . . 17 ohms
Transformation ratio: 1.400:1
Connectors (on rear):
Standard resolver interface:
Autotech std. 10-pin MS connector
Modbus Plus interface:
9-pin D connector
24 VDC input power:
6-pin connector

MECHANICAL

Housing size:
Size 40—4.0"(101.6 mm) dia.

Max. Starting Torque:
8 oz-in (576.1 gm/cm) @ 77 °F (25 °C)
Moment of Inertia (gm/cm^2): 45
Max. Slew Speed (rpm): 5,000
Shaft size: . . . . . 5/8" (15.9 mm)
MAX. SHAFT LOADING:
Axial: . . . . . 50 lb. (22.7 kg.)
Radial: . . . . . 100 lb. (45.4 kg.)
Bearing life at Max. Mfr. Spec. (Rev.):
2 x 10^9
Approx. Weight: . . . . . 8 lb. (3.63 kg.)

ENVIRONMENTAL

Shock: . . . . . 200 g for 11 msec
Vibration: . . . . . 20 g to 2,000 Hz
Temperature:
• **Operating:**
32 to 140 °F (0° to 60 °C)
• **Storage:**
-40 to +185 °F (-40° to 85 °C)
Enclosure: . . . . . NEMA 13

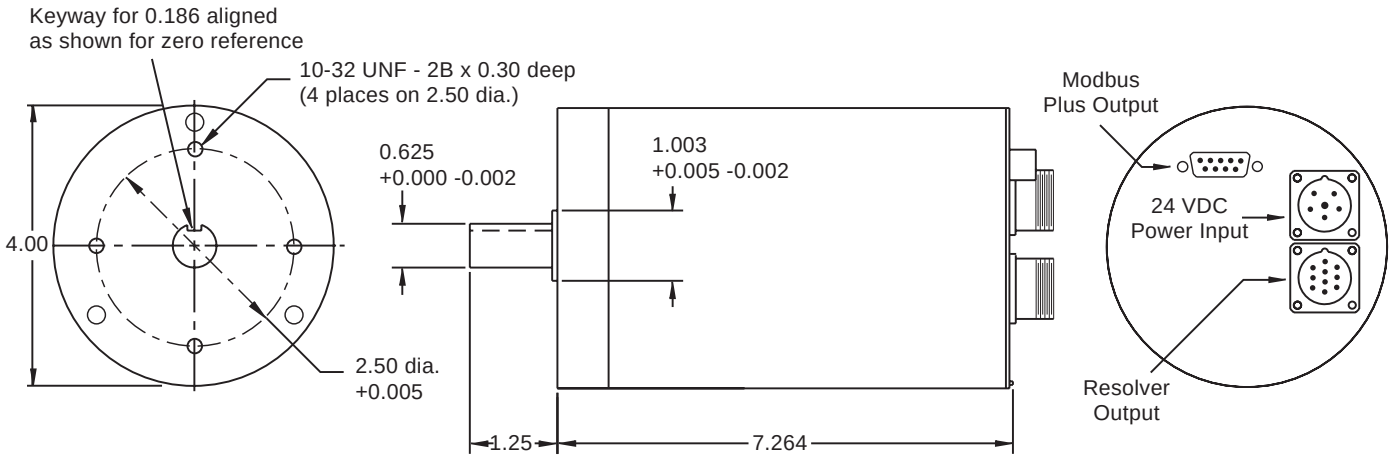
Modbus Plus Interface:

Direction of increasing counts:
CW/CCW, DIP switch selectable
Resolution: . . . . . 360 degrees
Resolver Data Format:
Binary format (range 0-359)
Node Address:
1-64
(Set using internal DIP switches)
Modbus Plus Connector:
Standard pinout 9-pin D connector
Node Data:
Position & Status available in node registers as well as broadcast as global data. (See table below)

Node Data:

Data:	Register:	Global Data:
Position	40001	Word 1
unused	40002	Word 2
Status*	40003	Word 3

* Status word: Lower Byte—Revision
Upper byte—Type Code (1 for RL220-MBP).



How to Order

SAC-RL220-MBP
Dual resolver, with Modbus connectivity

M8251 Series PLS Modules

PLC Plug-in Modules

Features:

- **16 Optically isolated Programmable Limit Switch (PLS) Outputs in one slot**
- **Highly repeatable, high-speed position-based outputs, independent of PLC scan time**
- **PLS setup from PLC Backplane, keypad, or from a PC**
- **PLS information, such as Output Status, Position, etc. always available to PLC through Backplane**
- **Leading/Trailing speed compensation**
- **Brake Monitor & Motion detection**
- **Angle ON—Time OFF Outputs**
- **Broken resolver wire detection**
- **Built-in 5-Key Keypad and Display**

PLS vs. PLC

A programmable limit switch provides outputs that remain ON for a programmed position dwell. A PLC can perform the same function by reading position from a position-input module, and then comparing the position with user-set limits and turning ON output if the position is within limits. However, the timings of the outputs will vary by the scan time of the PLC, which is not acceptable in many applications. The PLS module from AVG-Autotech offers many advantages over the PLC as far as PLS function is concerned:

1. The PLS module provides highly repeatable outputs independent of PLC scan time.
2. With PLS module, you do not have to write any software in PLC for performing PLS functions.
3. The PLS module makes it extremely easy to fine-tune dwells while the machine is in motion.
4. Advanced features of PLS module, such as speed compensation, require complex coding when implemented in PLC, particularly in ladder logic.

In addition, a PLC plug-in module provides position, RPM, and other status information to the PLC, eliminating the need for an additional position-input module.

Principle of Operation

The PLS module uses a resolver coupled to the machine shaft to acquire position information. The module constantly reads & decodes resolver signals, and then turns up to 16 PLS outputs on and off, based on user programmed set-points. The whole operation is much faster and is independent of the PLC.

Module setup

The M8251 gives you many choices to setup the module. You may setup the module from the keypad, PLC, or a PC. When programming from the PLC, you write a ladder logic program to set up parameters in the module.

The manual contains programming instructions for the user that enable him to enter the values/data which are automatically read and written as ladder logic rungs.

The M8251 PLS module interfaces with the Modicon PLC using Input & Output registers.

Programmable Resolution & Zero Offset

The PLS module has programmable resolution from 17 to 1,000 counts per turn. The unit features a dynamic zeroing or Mod-Z (Modification Zero) to modify the zero reference point, independent of the actual resolver position. After the PLS receives the Mod-Z input, the resolver position is reset to zero.

Modicon 800 Series PLC Plug-in Module

Brake Monitor

The unit offers time-based Brake Wear Monitoring to satisfy the OSHA requirement. The unit displays Press Stop Time after each stop of the machine. The unit can be programmed to have Brake Wear Monitoring Functionality (initiated by entering a Caution and Danger limit). These outputs are activated if the stop time exceeds the programmed limits. If you do not select Brake Wear Monitoring, the user must select ModZ or the unit defaults to normal PLS functionality. (If Brake Wear is selected, the unit cannot function as Mod-Z.)

Motion Detection

The unit has a built-in tachometer and motion detector. The motion detector can only energize a relay when the RPM is between the programmed low and high alarm values.

Advanced Features

The unit features a Speed Compensation (Rate Offset) to compensate for speed variations. The Rate Offset, individually programmable for each channel, is used to advance the PLS settings as a function of the machine speed. In addition, it has 4 channels that have Multislope Speed Compensation, programmable in 16 zones.

Angle-ON—Time-OFF

The unit can be programmed to have its outputs turned ON at an angle and turned OFF after a programmed time (instead of angle). For example, Channel 12 can be turned ON at an angle of 100∞ and stay ON for a period of 2.45 seconds. This feature is useful for controlling air or lubrication

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M8251 Series PLS Modules (cont.)

Specifications

PLC COMMUNICATION:
Through input and output registers
Slots: . . . . . one
I/O Addresses: . . . . . 6 In/6 Out

POWER REQUIREMENTS:
Backplane:
5 VDC @ 650 mA
Customer (Power Input):
24 VDC ± 15% @ 100 mA

ENVIRONMENTAL CONDITIONS:
Operating temperature:
-10 to +130 °F (-23 to +55 °C)
Relative humidity:
5 to 95% noncondensing

RESOLVER INTERFACE:
Position transducer:
Resolver, Autotech Series RL100 or E7R
Resolver cable:
Overall foil shielded, twisted-pair, such as Autotech's cable: CBL-10T22-XXX, 2,500 ft. max
Cable length between resolver and module:
2,500 ft. (762 m) max. shielded

PROGRAMMING:
All features programmable from keypad, IBM-compatible PC, or through the PLC backplane.
Number of PLS setups: . . . . . eight
PLS setpoints:
160 per PLS setup
Scale factor:
Programmable from 16 to 999
Offset:
Programmable from zero to Scale Factor value
Speed Compensation:
Programmable for each PLS channel. Leading-Edge & Trailing Edge Speed Compensation is available
Low and high motion limits:
Programmable from zero to 1,999 RPM

RESPONSE TIMES:
PLS outputs:
1.6 msec.
(0.8 msec. version available)
Tach. Update Time:
15 msec.
Position, Tach., and Output Status available to backplane:
Every 1.6 msec., typical
(0.8-msec. version available)

CONTROL INPUTS:
Electrical Specifications (all inputs):
Optical Isolation: 2,500 Vrms
Input impedance: 7,500 Ω
Logic Levels
TRUE: 20 to 30 VDC; 3 mA @ 24 VDC
FALSE: 0 to 2 VDC or open circuit
Program Enable (PE):
When TRUE, enables setpoint programming
Supervisor Enable (SE):
When TRUE, enables setpoint programming.
Output Enable (OE):
When TRUE, PLS Channel outputs enabled (Both Fault and Motion always enabled).

INPUTS:
ModZ Input (mutually exclusive with Brake Wear Monitor):
ModZ inputs when TRUE enables Modification to Zero
Brake Input (BI):
Input BI must be TRUE when brake is applied (Clutch disengaged)
Input BI must be FALSE when brake is disengaged (Clutch is applied)
Brake Clear (BC):
Brake Clear when TRUE clears Stopping Time and returns to Caution Condition

OUTPUTS:
Fault Output:
Normally energized; deenergizes if broken resolver wire or internal fault is detected.
Motion Output:
Output energized whenever resolver RPM is between programmed motion limits.
PLS Outputs:
Number of PLS Outputs: 16

OUTPUT SPECIFICATIONS:
Customer power:
24VDC Nominal ± 15%
All Outputs (16 PLS, Fault, and Motion):
N-type or P-type (factory ordered)
Up to 2 Amp per output;
10 Amp total per module
Optical Isolation: 5,000 Vrms

How to Order

Part Number	Description
SAC-SA101-M x 00 1	M8251 PLS Module

1:	Output	Substitute for **x** from the following:
	P	PNP Sourcing
	N	NPN Sinking

Note: Slave Modules share a resolver with other devices. To order this module as a slave unit, substitute **S** for **M** in the part number (**SAC-SA 101-M x 00**).

Example:
SAC-SA101-MN000

The part number above describes an M8251 PLS module configured as a master unit with NPN sinking output.

This unit requires a single-turn resolver as an input device, such as AVG Autotech's RL100 or E7R resolvers.

M8350 Series
Position Feedback Module

PLC Plug-in
Resolver Decoder Modules

Modicon 800 Series PLC Plug-in Module

Features

- **Resolver-Based Position feedback system**
- **Absolute position—No loss of position during power loss**
- **Resolver offers reliability under extreme conditions**
- **Noise-immune ratiometric decoding**
- **Programmable resolution from 20 to 4,096 counts-per-turn**
- **Programmable Offset for electronic alignment**
- **Programmable position format—Binary, BCD, or Gray code**
- **Broken resolver wire detection**
- **Built-in Keypad and Display**

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Position Feedback

A PLC controlling a press needs press position feedback all the time. The two most common ways to provide position-feedback are an optical encoder with a counter card, and a resolver with a decoder. AVG-Autotech offers a versatile resolver-based position feedback system.

Resolver vs. Optical Encoders

A resolver has several advantages over an optical encoder:

- Completely passive—electromagnetic device
- Rugged & robust—tolerates higher mechanical shock & vibrations compared to fragile glass-disk encoders
- Wide temperature range—No condensation problems at low temperature
- Immune to plant environment—Oils, mists, dusts, etc.
- Absolute position compared to incremental encoders

Because of these advantages and the resolver's track record in automotive pressrooms, more stamping plants prefer a resolver-based system to optical encoder-based systems.

PLC Interface

The position feedback module uses a noise-immune ratiometric method to decode resolver signals. The decoded position in passed to the PLC through the backplane.

The module may be programmed from the PLC or keypad in front of the module. The module communicates with the PLC using Input & Output registers.

Programmable Resolution

Unlike optical encoders, the M8350 offers you a programmable resolution from 20 to 4,096 counts-per-turn.

Dynamic Zeroing

The unit features a dynamic zeroing or Mod-Z (Modification Zero) to modify the zero reference point, independent of the actual resolver position. After the PLS receives the Mod-Z input, the resolver position is reset to zero.

Built-in Motion Detector and Tachometer

The unit has a built-in tachometer and motion detector. The motion detector can only energize a relay when the RPM is between the programmed low and high alarm values.

Broken-Wire Detection

The unit features a broken resolver-wire detector to supervise the resolver input signal. The broken-wire detector will signal the fault output if the resolver is missing any signals.

M8350 Series Position Feedback Module (cont.)

Specifications

PLC COMMUNICATION:
Slots: . . . . . one
I/O Addresses: . . . . . .4 In/4 Out

POWER REQUIREMENTS:
Backplane:
5 VDC @ 650 mA
Customer (Input Power):
24 VDC ±15% @ 100 mA

ENVIRONMENTAL CONDITIONS:
Operating temperature:
-10 to +130 °F (-23 to +55 °C)
Relative humidity:
5 to 95% noncondensing

RESOLVER INTERFACE:
Position transducer:
Resolver; Autotech Series RL100 or E7R.
Cable length between resolver and M8350:
2,500 ft (762 m) max, shielded
Resolver cable:
Overall foil shielded, twisted-pair, such as Autotech's cable (CBL-10T22-xxxx)

PROGRAMMING:
All features programmable from keypad or through backplane
Scale factor:
Programmable from 19 to 4,095 (resolution 20 to 4,096 counts/turn)
Offset:
Programmable from zero to scale factor value
Fault detector:
TRUE (active) on power up. FALSE if broken resolver wire or internal fault is detected.
Motion detector:
Low and high motion limits are programmable from zero to 1,999 RPM. Motion detector is TRUE when the machine's RPM is within the programmed limits. Motion detector's status is available on the backplane.

RESPONSE TIMES:
Tach update time:
15 msec.
Position, tach, and output status available to backplane:
Every 700 µsec., typical

CONTROL INPUTS:
Program Enable (PE):
PE must be TRUE for setup programming
Output Enable (OE):
OE must be TRUE for outputs to be enabled (applies only when optional ASY-M8250-NOUT module is used)

ELECTRICAL SPECIFICATIONS (All Inputs):
Optical isolation:
2,500 VAC RMS
Input current:
3 mA, typical @ 24 VDC
Logic levels:
TRUE: 21 to 27 VDC (V+ relative to V-) (not to exceed)
FALSE: <1 VDC

How to Order

Part Number	Description
SAC-SA102-M 0000	M8350 position feedback module for single-turn resolver

Note: Slave Modules share a resolver with other devices. To order this module as a slave unit, substitute **S** for **M** in the part number (**SAC-SA 102-M 0000**).

Example:
SAC-SA102-M0000
The part number above describes an M8350 PLS module configured as a master unit.

The unit requires a single-turn resolver such as AVG Autotech's RL100 or E7R resolvers.

DeviceNet Scanner For Modicon TSX Quantum PLCs

Lets you connect your DeviceNet devices to a Modicon TSX Quantum PLC

Features:

- **A single-slot module that resides in a Modicon TSX Quantum PLC.**
- **Lets you connect up to 63 slave devices.**
- **Communicates directly with the PLC's backplane using 16 or 32 input and output registers.**
- **DeviceNet time can be saved by not transferring I/O values unless a change-of-state (COS) has occurred.**
- **DeviceNet transfer of I/O data can be scheduled (cyclic data).**

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The PLC DeviceNet Scanner acts as an interface between DeviceNet devices such as photoelectric sensors, proximity switches, valve manifolds, motor starters, process sensors, bar code readers, variable frequency drives, panel displays, and operator interfaces and a Modicon TSX Quantum PLC processor. It provides connection to a single DeviceNet network. It communicates with DeviceNet devices over the network to:

- Read inputs from a device
- Write outputs to a device
- Download configuration data
- Monitor a device's operational status

Information exchanged includes device I/O data, status information, and configuration data.

DeviceNet Basics

DeviceNet is an open network standard. This means that users may specify, install, and use various products from a wide number of suppliers without the need to purchase special equipment, software, or licensing rights. Thus, the user can create a system from a variety of vendors, yet specific to the exact application, mainly using off-the-shelf parts.

DeviceNet is a low-cost communication link that connects industrial devices, such as limit switches, photoelectric sensors, proximity sensors, valve manifolds, motor starters, process sensors, bar code readers, variable frequency drives, panel displays, and operator interfaces to a common network.

Networking devices eliminates the necessity for expensive hard wiring, and the attendant testing and maintenance that goes with it. It also reduces the cost and time needed to wire and install automation devices, while providing improved ommunication between devices, as well as important device-level diagnostics not easily accessible or available through hardwired I/O interfaces.

Modicon TSX
Quantum PLC Plug-in DeviceNet Scanner Module

The DeviceNet Functionality

The DeviceNet bus topology is described as "Linear" (trunkline/dropline); and power and signal reside on the same network. Nodes may be removed or inserted from the network without powering down the network.

Bus Addressing is either:

Peer-to-Peer with Multi-Cast— Peer-to-peer are generally token-pass networks. Each device can send messages only when they have the token. The token gets passed based on node number (round robin) or possibly via user defined priority list. There is no sense of mastership or priority and it it not deterministic. Multi-Cast allows one-to-many and many-to-one relationships to be built dynamically.

Multi-Master with Multi-Cast— Multi-Master addressing is where more than one unit acts as a Master.

Master/Slave special case—polled or change-of-state (exception-based). Rather than a Master going through a polling list (scanning), devices report data (input or output) on a COS (change-of-state) basis as the events occur. This mode is considered more efficient for discrete applications. Network traffic is reduced, significantly.

DeviceNet Scanner (cont.)

DeviceNet supports the following operations:

Strobed—Multicast message starts off the scan cycle. Strobable slaves respond, based on their latency.

Polled—Master interrogates each node according to the "polling list." Polls are sent out even as strobe responses are being received, as bandwidth allows.

Cyclic—Devices report data on a user-configured time increment basis (input or output). Cyclic data production is considered more efficient for applications with slowly changing analog I/O.

Change-of-State (COS)—Device reports its data only when there is a change. This is considered more efficient since only data changes are transmitted. It can be used along with Poll or Strobe.

Application-triggered data movement—Rather than being triggered by a Master, the movement of data is initiated by the application.

A DeviceNet product may behave as a Client or a Server or both. Up to 64 node addresses, called Media Access Control Identifiers or "MAC IDs" can be connected to a single DeviceNet network and the end-to-end network distances that can be accommodated are dependent on the speed of the network. A DeviceNet running at a baud rate of 125 kbps can extend up to 500 meters (1,640 ft) while a DeviceNet, running at a baud rate of 500 kbps, can only go 100 m (328 ft).

Specifications

DeviceNet Data:

- Strobed-Multicast message starts off the scan cycle. Strobable slaves respond, based on their latency.
- Polled-Master interrogates each node according to the "polling list." Polls are sent out even as strobe responses are being received, as bandwidth allows.
- Cyclic-Devices report data on a user-configured time increment basis (input or output). Cyclic data production is considered more efficient for applications with slowly changing analog I/O.
- Change-of-State (COS)-Device reports its data only when there is a change. This is considered more efficient since only data changes are transmitted. It can be used along with Poll or Strobe.
- Application-triggered data movement-Rather than being triggered by a Master, the movement of data is initiated by the application.
- Configurable data
- Background poll rate
- Strobe or poll for each node

PLC Processor-to-Scanner Communication:

16 Input/16 Output registers or
32 Input/32 Output registers,
user selectable.

Power Consumption:

- DeviceNet Current Load: 90 mA (max.)
- Backplane Current Load: 700 mA @ 5 VDC (max.)

Communication Rates:

125 kbps, 250 kbps, 500 kbps

Messaging Capabilities:

Master: . . . .Poll, strobe, COS, or cyclic

Isolation:

Optical isolation between Backplane and Channel 1

Module Location:

Any I/O slot in Quantum PLC rack

Network Address: 00-63

ENVIRONMENTAL CONDITIONS:

Operating Temperature:

32 to 140 °F (0 to 60 °C)

Storage Temperature:

-40 to +185 °F(-40 to +85 °C)

Humidity:

5 to 95%, noncondensing

Shock Unpacked:

- **Operating:** 30g
- **Nonoperating:** 50g

Vibration:

Unpacked: 5g from 10 to 500 Hz

How to Order

SAC-QDNET-010:

DeviceNet scanner module for Quantum PLC

M7251 PLS and DPPLS

PLC Plug-in Modules for PLS and Die Protection/PLS functions

Features:

- **16 PLS channels in one slot (8 optically isolated PLS outputs, 8 through backplane)**
- **5 Inputs (PLS), 7 Die Protection Inputs (DPPLS)**
- **Highly repeatable, high-speed position based outputs, independent of PLC scan time**
- **Module information, such as Output Status, Position, etc., always available to PLC through Backplane**
- **Leading/Trailing speed compensation**
- **Brake Monitor & Motion detection**
- **Angle ON—Time-OFF Outputs**
- **Broken resolver wire detection**

PLS vs. PLC

A programmable limit switch provides outputs that remain ON for a programmed position dwell. A PLC can perform the same function by reading position from a position-input module, and then comparing the position with user-set limits and turning ON output if the position is within limits. However, the timings of the outputs will vary by the scan time of the PLC, which is not acceptable in many applications. The PLS module from AVG-Autotech offers many advantages over the PLC as far as PLS function is concerned:

1. The PLS module provides highly repeatable outputs independent of PLC scan time.
2. With PLS module, you do not have to write any software in PLC to perform PLS functions.
3. The PLS module makes it extremely easy to fine-tune dwells while the machine is in motion.
4. Advanced features of PLS module, such as speed compensation, require complex coding when implemented in PLC, particularly in ladder logic.

In addition, a PLC plug-in module provides position, RPM, and other status information to the PLC, eliminating the need for an additional position-input module.

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M7251 PLS Module

Principle of Operation

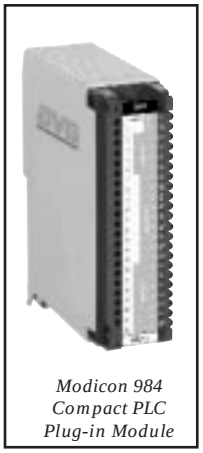
The PLS module uses a resolver coupled to the machine shaft to acquire position information. The module constantly reads & decodes resolver signals, and then turns up to 16 PLS outputs ON and OFF, based on user programmed setpoints. The whole operation is much faster, and is independent of the PLC.

Module setup

The M7251 gives you many choices to setup the module. You may setup the module from the PLC or a PC. When programming from the PLC, you write ladder logic program to setup parameters in the module. The manual contains programming instructions for the user that enable him to enter the values/data which are automatically read and written as ladder logic rungs. The M7251 PLS module interfaces with the PLC using Input & Output registers.

Dynamic Zeroing

The unit features a dynamic zeroing or Mod-Z (Modification Zero) to modify the zero reference point, independent of the actual resolver position. After the PLS receives the Mod-Z input, the resolver position is reset to zero.



Modicon 984 Compact PLC Plug-in Module

Modicon TSX Quantum PLC Plug-in Module

Brake Monitor

The unit offers time-based Brake Wear Monitoring to satisfy the OSHA requirement. The unit displays Press Stop Time after each stop of the machine. The unit can be programmed to have Brake Wear Monitoring Functionality (initiated by entering a Caution and Danger limit). These outputs are activated if the stop time exceeds the programmed limits. If you do not select Brake Wear Monitoring, the user must select ModZ or the unit defaults to normal PLS functionality. (If Brake Wear is selected, the unit cannot function as Mod-Z.)

Built-in Motion Detector and Tachometer

The unit has a built-in tachometer and motion detector. The motion detector can only energize a relay when the RPM is between the programmed low and high alarm values.

Leading- and Trailing-Edge Speed Compensation

The unit features a Speed Compensation (Rate Offset) to compensate for speed variations. The Rate Offset, individually programmable for each channel, is used to advance the PLS settings as a function of the machine speed. In addition, it has 4 channels that have Multislope Speed Compensation, programmable in 16 zones.

Angle ON-Time OFF

The unit can be programmed to have its outputs turned ON at an angle and turned OFF after a programmed time (instead of angle). For example, Channel 12 can be turned ON at an angle of 100° and stay ON for a period of 2.45 seconds. This feature is useful for controlling air or lubrication.

7251 DPPLS Module

The M7251 DPPLS module offers a highly integrated PLC plug-in module with 7 outputs PLS, 5 input Die Protection, Brake Monitor, and Motion Detector, all in one module. The PLS function has the same advanced features as those available in M7251 PLS module.

Die Protection

The M7251 DPPLS module has 5 inputs for Die Protection sensors.
These inputs can independently be programmed to monitor a variety of sensor events within programmable dwells, and to active either E-stop or T-stop if the event does not occur. The E-stop output is wired in the press circuit to stop the press immediately. The engagement angle feature ensures that the press does not stick at the bottom by disabling E-stop output between the engagement angle and BDC.

Tool Name:

Each tool (set-up) can be given a 0-8 character name for easy reference; the tool set-up can be searched by this name.

Specifications

CARD LOCATION:
Uses one slot PLC rack

PLC COMMUNICATION:
Through input and output registers; allocate 12 Input and 12 Output registers for Modicon 984 Compact, 6 IN, 6 OUT for TSX Quantum

POWER REQUIREMENTS:
Customer (Power Input):
24 VDC ± 15% @ 100 mA
Position Transducer:
Resolver, Autotech Series RL100 or E7R
Motion Detector:
Programmable Low and High limits, 0-999 RPM
Brake Monitor:
Programmable Caution and Danger Limits zero to 9.99 sec. max.
Fault Output:
Normally energized. Deenergizes if broken resolver wire or internal fault is detected.
Motion Output:
Output energized whenever resolver RPM is between programmed limits.

RESOLVER INTERFACE:
Position transducer:
Resolver; Autotech Series RL100 or E7R.
Cable length between resolver and M8350:
2,500 ft (762 m) max, shielded
Resolver cable:
Overall foil shielded, twisted-pair, such as Autotech's cable (CBL-10T22-xxxx)

M7251PLS Module

PLS Outputs: 16
PLS setpoints:
112 per PLS setup (maximum of 56 per group of 8 outputs)
No. of Setups: . . . . . eight
Speed Compensation:
Each PLS output has it's own compensation. Leading-Edge and Trailing-Edge speed compensation available.

M7251DPPLS Module

No. of Setups: 40
PLS Outputs: 7
PLS setpoints:
112 per PLS setup (maximum of 56 per group of 8 outputs)
No. of Counters: . . . . . four
Speed Compensation:
Leading and Trailing, independently programmable for each channel
Engagement Angle:
Programmable zero to 189°
Die Protection Inputs: . . . . . five
Die Protection Outputs:
Two; E-stop and T-stop

How to Order

Part Number		Description
SAC xx	xxx - x 000	PLS, DP, or DPPLS module
1	2 3	Substitute for x from the following:
1:	**PLC Type**	
	MD	Modicon 984-A120 Compact
	TX	Modicon TSX Quantum
2:	**Function Type**	
	101	PLS-Programmable Limit Switch (both versions have Brake Wear Monitors, Motion Detector, and Fault Outputs) Modicon 984-A120 Compact: 16 PLS outputs(8 discrete; 8 through PLC backplane) Modicon TSX Quantum: 16 discrete PLS outputs
	106	DP-Die Protection with 8 Programmable Inputs
	107	DPLS-Die Protection (5 inputs) and Programmable Limit Switch (7 outputs), Brake Wear Monitors, Motion Detector, and Fault Outputs
3:	**Output Mode**	
	N	NPN Sinking Transistor Output
	P	PNP Sourcing Transistor Output

Example:
SAC-TX-106-M P 000

The part number above specifies a master M7251 die protection module with PNP sourcing transistor outputs for use in a Modicon TSX Quantum PLC.

Slave unit: To order a slave module, substitute **S** for **M** in the part number.

All of the above units require a single-turn, single-turn geared, or a multiturn geared resolver as an input device, such as AVG Autotech's RL100 or E7R resolvers.

M7350 Series Position Feedback Modules

PLC Plug-in Resolver Decoder Modules for Single and Dual Resolvers

Features

- **Resolver-based position feedback modules for Quantum & A120 PLCs**
- **Absolute position-Tracks position, even if movement occurs during power loss**
- **Resolver offers reliability under extreme conditions**
- **Noise-immune ratiometric decoding**
- **Resolution:**
  M7350-010 (*Single Resolver*): Programmable resolution from 20 to 1,024 counts-per-turn
  M7350-020 (*Dual Resolver*): Up to 1,024 counts-per-turn, 128 turns max.
- **Programmable Offset for electronic alignment**
- **Broken resolver wire detection**

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Position Feedback

A PLC controlling a machine needs position feedback all the time. Two of the most common ways to provide position-feedback are an optical encoder with a counter card, or a resolver with a decoder. AVG Autotech offers a versatile resolver-based position feedback system.

A resolver has several advantages over an optical encoder:

- Completely passive-electro-magnetic device
- Rugged & robust-tolerates higher mechanical shock & vibrations compared to fragile glass-disk encoders
- Wide temperature range-no condensation problems at low temperature
- Immune to plant environment-oils, mists, dusts, etc.
- Absolute position compared to incremental encoders

Because of these advantages and the resolver's track record in automotive pressrooms, more stamping plants prefer a resolver-based system to optical encoder-based systems.

PLC Interface

The position feedback module uses a noise-immune ratiometric method to decode resolver signals. The decoded position is passed to the PLC through the backplane. The module may be programmed from the PLC. The module communicates with the PLC using Input & Output registers.

M7350-010 Single Resolver Model

The module works with AVG Autotech's RL100 or E7R single resolvers. Resolution is programmable from 20 to 1,024 counts-per-turn.

M7350-020 Dual Resolver Model

The module works with AVG Autotech's dual (multiturn) resolver RL210 with 128:1 gear ratio. Resolution is up to 1,024 counts-per-turn, 128 turns maximum.

Modicon 984 Compact PLC Plug-in Module

Modicon TSX Quantum PLC Plug-in Module

Programmable Offset

Both units feature a Programmable Offset which modifies the zero reference point, independent of the actual resolver position. This allows you to electronically align the resolver zero with the machine's zero-making installation easier.

Built-in Tachometer and Motion Detector

In the M7350-010 Module, the built-in tachometer and motion detector are updated over 68 times per second to provide fast, accurate indication and detection of rotary motion. The motion detector is programmed to energize the motion I/O status bit when the machine's RPM is between the low and high motion limits.

Broken Resolver Wire Detection

The M7350 Series ensures system integrity by detecting broken resolver cable wire. The Broken Wire I/O Status Bit is normally energized when the Module is operating normally and the resolver wire is intact. If the resolver is missing any signals, this information is passed to the PLC through its backplane, and the I/O Status Bit output is deenergized.

M7350 Series Position Feedback Modules (cont.)

Specifications

Card Location:
Uses one PLC slot (any location)

PLC Communication:
Through input and output registers; allocates 12 input and 12 output registers for Modicon 984 Compact; 6 IN, 6 OUT for TSX Quantum.

Customer (Input Power):
24 VDC ±15% @ 100 mA

ENVIRONMENTAL CONDITIONS

- **Operating temperature:**
  -10 to +130 °F (-23 to +55 °C)
- **Relative humidity:**
  5 to 95% noncondensing

RESOLVER INTERFACE

Position transducer:

- **M7350-010:**
  AVG Autotech Single Resolver (Series RL100 or E7R), or equivalent.
- **M7350-020:**
  AVG Autotech Dual Resolver (Series RL210), or equivalent.

Cable length between resolver and the module:
2,500 feet max, shielded

Resolver cable:

M7350-010 to Single Resolver:
22 AWG, 10-conductor (5 twisted pairs) overall foil shielded cable with 10-pin MS connector on one end, such as AVG Autotech's CBL-10T22-M xxx

M7350-020 to Dual Resolver:
22 AWG, 10-conductor (5 twisted pairs) overall foil shielded cable with 19-pin MS connector on one end, such as AVG Autotech's CBL-RL210-M xxx.

PROGRAMMING:
All features programmable through backplane, except as noted.

Scale factor:

M7350-010 (Single Resolver):
Programmable from 19 to 1,023 (resolution 20 to 1,024 counts/turn)

M7350-020 (Dual Resolver):
Not programmable

Offset:

M7350-010 (Single Resolver):
Programmable from zero to scale factor value

M7350-020 (Dual Resolver):
Coarse: 0-127; Fine 0-1,023

Position formats:
Binary

Fault detector:
TRUE-(active)Normally ON .
FALSE-If broken resolver wire or internal fault is detected.

Motion detector:
Low and high motion limits are programmable from zero to 1,999 RPM (M7350-010-single resolver-only). Motion detector is TRUE when the machine's RPM is within the programmed limits. Motion detector's status is available on the backplane.

RESPONSE TIMES

Tach update time:
15 ms

Position, tach, and output status available to backplane:
Every 0.6 msec typical

How to Order

Part Number	Description
SAC - xx xxx - M0000	M7350 Series Position Feedback Module
1 2	Substitute for x from the following:

1: PLC Type

MD	Modicon 984-A 120 Compact
TX	Modicon TSX Quantum

2 = Function Type

102	M7350-010: 10-bit, single-turn resolver decoder (fully absolute)
103	M7350-020: 17-bit, multiturn resolver decoder (fully absolute) 10 bits/turn, over 128 total turns

Note: Slave Modules share a resolver with other devices. To order this module as a slave unit, substitute **S** for **M** in the part number (**SAC - xx xxx - M0000**).

Example:

SAC-TX-102-M P 000

The above part number specifies a master M7350 10-bit, single-turn resolver decoder (fully absolute) module for use in a Modicon TSX Quantum PLC.

All of the above units require an input device such as Autotech's RL100 or E7R, (for M7350-010, single-turn) or Autotech's RL210 dual resolvers (for M7350-020, multiturn geared). Please see page 10 for more information on resolvers.

M7350-RSHI Series
Shut-Height Feedback Modules

PLC Plug-in Dual-Resolver Decoder Modules

Features:

- **Resolver-Based Shut-Height feedback system for Quantum and A120 PLCs**
- **Simple to calibrate**
- **Programmable Safety Limits & Drift Limits**
- **Storage for up to 500 die setups**
- **Die sets can be identified with names**
- **Uses AVG-Autotech's RL210 128:1 gear ratio resolver**
- **Absolute position-No loss of position during power loss, even if there is movement**
- **Resolver offers reliability under extreme conditions**
- **Broken resolver wire detection**
- **Occupies only one slot in rack**

For your local AVG Automation Distributor or Technical Support inside the U.S. call: 1-800-TEC-ENGR.

ModConnect®

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The nature of today's metal stamping business requires that manufacturers produce a greater variety of parts. This means that each time a new part has to be produced, the dies have to be changed. Every die has its own characteristics and may require different setup parameters than the previously used die. Failing to use the proper setup parameters could lead to damage of the new die and/or the press or poorly made parts. Die changeover is labor-intensive and time-consuming and downtime during die changeover is costly-reducing profits.

Shut Height

Shut-height is defined as the distance between the top surface of the bolster and the bottom surface of the ram (slide), where the ram is all the way down in the press stroke (at 180°).

This module provides the information necessary for a PLC to control shut-height. Controlling shut-height is critical to maintaining high-quality part production. If the shut-height is too large, low-quality parts are made. If the distance is too tight, damage can occur to the part, die, and/or press.

Traditional methods used to control shut-height require the use of vernier calipers and shim blocks. It can take literally hours to properly set the shut-height for a new die. Those days are at an end.

M7350-RSHI-for Shut-Height Feedback

The M7350-RSHI resolver-based shut-height feedback module is a convenient way for your Modicon PLC to monitor Press Shut-Height values. A module takes up only one slot in the PLC and communicates with the PLC via several I/O registers. The position-input signals come from a multiturn resolver (such as an AVG Autotech RL210 or E8R), mounted on the adjusting screw of the ram.

Modicon 984 Compact PLC Plug-in Module

Modicon TSX Quantum PLC Plug-in Module

With the M7350-RSHI, the press setup man no longer needs to carry around a list of the shut-heights for each die. Once the shut-height has been established for a particular die set, the M7350-RSHI module retains this value and associates it with the die name (up to 8 alphanumeric characters long) and/or number of the die set.

To maintain high-quality part production, it's necessary that the die does not drift too far from the shut-height value. The value of "drift" that can be allowed is also entered as a part of the die identification data.

During die changeover, the operator need only enter a particular die number or die name. When the automatic die positioning sequence is activated by the PLC, the M7350-RSHI provides the die position information to the PLC so it may control the adjustment of the shut-height to the preprogrammed position.

During production, the M7350-RSHI monitors the amount of drift that occurs. If the preset value is exceeded, it deenergizes the drift limit error and the PLC stops the press. It also monitors the preset safety limits. If either the upper or lower safety limit is exceeded, the M7350-RSHI deenergizes either the upper or lower safety limit, alerting the PLC to shut down the press

M7350-RSHI Series Position Feedback Modules (cont.)

Simple to Calibrate

Calibration is quite simple and does not require any computations by the user or PLC. All the user has to do is move the ram to the first and second calibration positions and enter the corresponding values for those positions. The unit computes scaling of the parameters automatically. (Calibration points must be between safety limits.)

Features include:

Scaling: After the upper calibration and lower calibration points are entered, the M7350-RSHI automatically scales the output position value for any point between the upper and lower safety limits. This saves the PLC from having to perform this computation.

Programmable Drift Limits: The M7350-RSHI constantly monitors the die position and deenergizes the fail-safe Drift Output if the measured die position moves outside the drift limits from the programmed position in either direction. The drift limit must be in the range: 0.000 to 0.250.

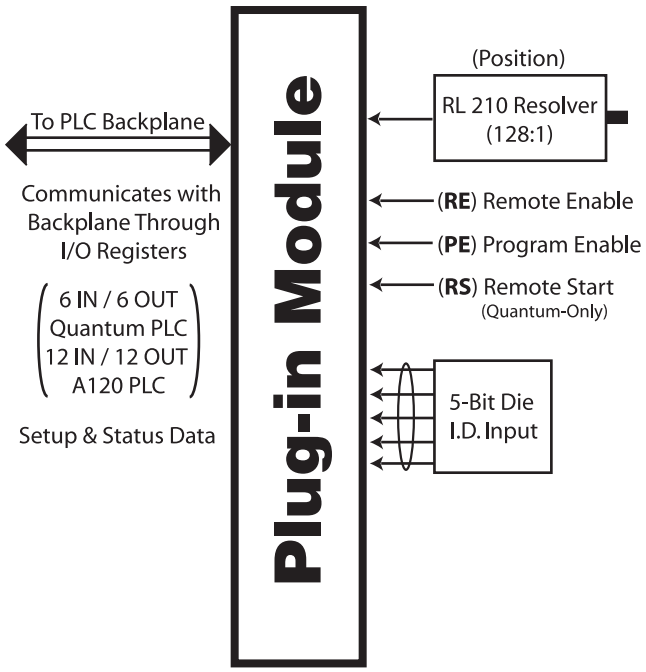
Programmable Backoff Distance: The Backoff Distance is that distance above the programmed position that the die will travel when it is being positioned from below the programmed position. The backoff distance value must be in the range 0 to 0.250.

Programmable Safety Limits: The Safety Limits define the upper and lower safe positions for die movement. If a Safety Limit is exceeded, either the Upper or Lower Safety Output will be deenergized.

Die Setup Storage: Variables for 500 single-action or dual-action dies can be preprogrammed and stored for later use. During a die change-over, the the Remote Enable (RE) Input allows the operator to select any one of 32 setups (Quantum-only). The PLC can access all 500 setups via the backplane. The operator can enter either a particular die number or die name to initiate the automatic die positioning sequence. The M7350-RSHI monitors the die position and provides this information to the PLC so it may control adjustment of the shut-height to the preprogrammed position.

Resolver RL210

Position information is provided by a resolver (AVG Autotech's dual resolver, RL210 with 128:1 gear ratio, or equivalent). The resolver is mounted to the Press Shut-Height Adjustment Drive Train (through some gears, if required).



M7350-RSHI

M7350-RSHI Series Shut-Height Feedback Modules (cont.)

Specifications

Card Location:
Uses one PLC slot (any location)

PLC Communication:
Through input and output registers; allocate 12 input and 12 output registers for Modicon 984 Compact, 6 IN, 6 OUT for TSX Quantum.

Customer (Input Power):
24 VDC (15% @ 100 mA

Position Transducer:
Dual Resolver; Autotech Series RL210 (128:1 gear) or equivalent

Position Information:
Available in two registers.

Upper and Lower Travel Limits:
True within travel range.
False when above or below travel range.

INPUTS:

Active:
Contact closure to power supply common (Vs-); or a solid-state sinking output with less than 0.8 V drop @ 10 mA.

Inactive:
Open or power supply positive (Vs+).
PE (Program Enable): Must be energized to change any operator parameters.
RE (Remote Enable): Enables up to 32 Die Setup I.D.

How to Order

Part Number	Description
SAC - xx 104 - M0000 1	M7350 Shut-Height Feedback Module

1:	PLC Type	Substitute for xx from the following:
	MD	Modicon 984-A 120 Compact
	TX	Modicon TSX Quantum

Note: Slave Modules share a resolver with other devices.
To order either module as a slave unit, substitute **S** for **M** in the part number.

Example:
SAC-TX104-M0000

The above part number specifies a master M7350 dual-resolver-based Shut-Height feedback module (fully absolute) module for use in a Modicon TSX Quantum PLC.

The above units require a dual (multiturn) resolver as an input device, such as Autotech's RL210 (128:1 gear) resolvers.

M7350-RSHC Series Shut-Height Control Modules

PLC Plug-In Dual-Resolver Decoder Module

Features

- **Resolver-Based Shut-Height control system for Quantum and A120 PLCs**
- **Simple to calibrate**
- **Programmable Safety Limits & Drift Limits**
- **Storage for up to 500 die setups**
- **Die setups can be identified with names**
- **Absolute position-No loss of position during power loss, even if there is movement**
- **Resolver offers reliability under extreme conditions**
- **Broken resolver wire detection**
- **Occupies only one slot in rack**

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ModConnect®

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The nature of today's metal stamping business requires that manufacturers produce a greater variety of parts. This means that each time a new part has to be produced, the dies have to be changed. Every die has its own characteristics and may require different setup parameters than the previously used die. Failing to use the proper setup parameters could lead to damage of the new die and/or the press or poorly made parts. Die changeover is labor-intensive and time-consuming and downtime during die changeover is costly-reducing profits.

Shut Height

Shut-height is defined as the distance between the top surface of the bolster and the bottom surface of the ram (slide), where the ram is all the way down in the press stroke (at 180°).

Controlling shut-height is critical to maintaining high-quality part production. If the shut-height is too large, low-quality parts are made. If the distance is too tight, damage can occur to the part, die, and/or press.

Traditional methods used to adjust shut-height require the use of vernier calipers and shim blocks. It can take literally hours to properly set the shut-height for a new die. Those days are at an end.

M7350-RSHC-for Shut-Height Control

AVG Autotech's M7350-RSHC resolver-based shut-height control module is a convenient way to provide Press Shut-Height Control functionality to your Modicon PLCs. A module takes up only one slot in the PLC and communicates with the PLC via several I/O registers. The position-input signals come from a multiturn resolver (such as an AVG Autotech RL210 or E8R) mounted on the adjusting screw of the ram.

With the M7350-RSHC, the press setup man no longer needs to carry around a list of the shut-heights for each die. Once the shut-height has been established for a particular die set, the M7350-RSHC module retains this value and associates it with the die name (up to 8 alphanumeric characters long) and/or number of the die set.

Modicon 984 Compact PLC Plug-in Module

Modicon TSX Quantum PLC Plug-in Module

Variables for 500 single-action or dual-action dies can be preprogrammed and stored for later use. During a die changeover, the Remote Enable (RE) Input allows the operator to select any one of 32 setups (Quantum-only). The PLC can access all 500 setups via the backplane. After the operator enters either a particular die number or die *name*, the automatic die positioning sequence can be initialized either by the PLC or (Quantum only) the operator (by activating the Remote Start input). The M7350-RSHC senses the die position and adjusts the shut-height to the preprogrammed position.

To maintain high-quality part production, it's necessary that the die does not drift too far from the shut-height value. The value of "drift" that can be allowed is also entered as a part of the die identification data.

During die changeover, the operator need only enter a particular die number or die *name*. When the automatic die positioning sequence is activated, either by an external input or via the PLC backplane, the M7350-RSHC senses the die position and adjusts the shut-height to the preprogrammed position.

During production, the M7350-RSHC monitors the amount of drift that occurs. If the preset value is exceeded, the press is stopped. It also monitors the preset safety limits, shutting down the press if either the upper or lower safety limit is exceeded.

M7350-RSHC Shut-Height Control Module (cont.)

Simple to Calibrate

Calibration is quite simple and does not require any computations by the user or PLC. All the user has to do is move the ram to the first and second calibration positions and enter the corresponding values for those positions. The unit computes scaling of the parameters automatically. (Calibration points must be between safety limits.)

Features include:

Automatic Scaling: After the upper calibration and lower calibration points are entered, the M7350-RSHC automatically scales the output position value for any point between the upper and lower safety limits. This saves the PLC from having to perform this computation.

Programmable Drift Limits: The M7350-RSHC constantly monitors the die position and deenergizes the fail-safe Drift Output if the measured die position moves outside the drift limits from the programmed position in either direction. The drift limit must be in the range: 0.000 to 0.250.

Programmable Backoff Distance: The backoff distance is that distance above the programmed position that the die will travel when it is being positioned from below the programmed position. The backoff distance value must be in the range 0 to 0.250.

Programmable Safety Limits: The Safety Limits define the upper and lower safe positions for die movement. The Safety Outputs will be triggered if a Safety Limit is exceeded.

Die Setup Storage: Variables for 500 single-action or dual-action dies can be preprogrammed and stored for later use. During a die changeover, the Remote Enable (RE) Input allows the operator to select any one of 32 setups (Quantum-only). The PLC can access all 500 setups via the backplane. After the operator enters either a particular die number or die name, the automatic die positioning sequence can be initialized either by the PLC or (Quantum only) the operator (by activating the Remote Start input). The M7350-RSHC senses the die position and adjusts the shut-height to the preprogrammed position

Backlash Elimination: An automatic antibacklash routine is built into the die set program so that the shut-height motor will always approach the programmed position from the same direction.

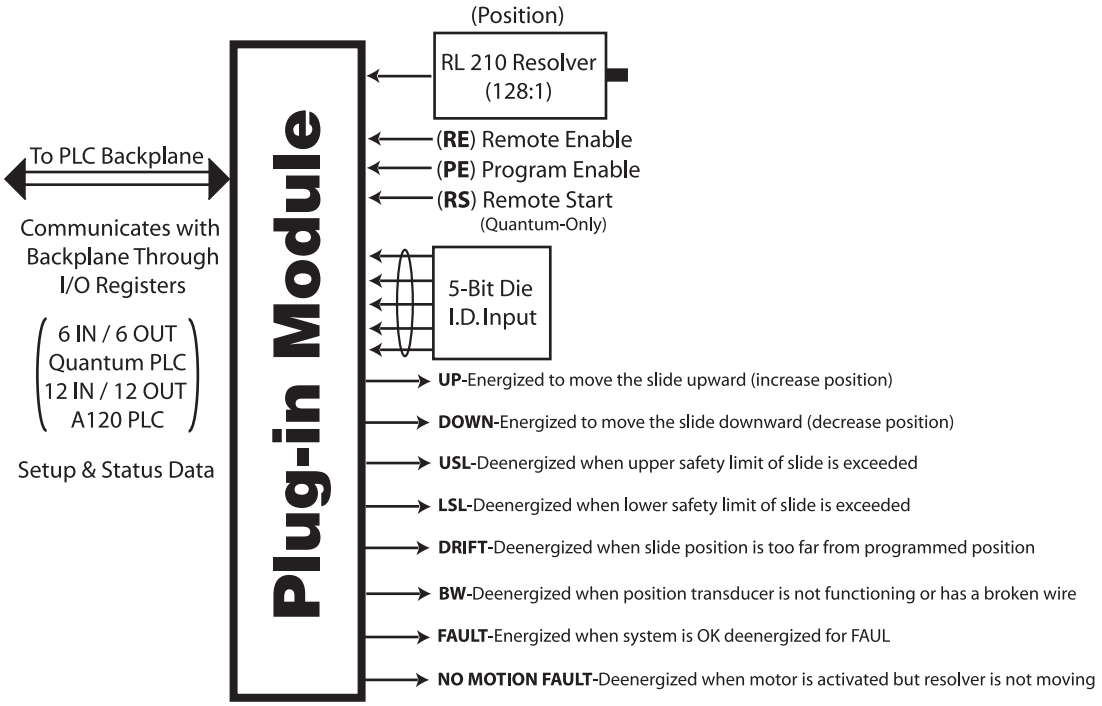
Programmable Correction Factor: For better precision, a Programmable Correction Factor may be entered for each die so the control motor will shut off in time to allow the die to coast to a stop at the desired shut height (must be less than backoff distance).

Pulse Timing (Jogging): To achieve a greater precision in positioning, the control motor can be pulsed instead of being run continuously once a certain distance (correction factor) above the programmed position is reached. The user has an option of setting the values for the duration of time the pulse is on and how long the pulse remains off. (Pulse ON/Pulse OFF-Maximum value is 59.99 sec. with a resolution of 10 msec.)

No Motion Error: This is signaled if the ram position has not changed within one second after the motor was turned ON.

Resolver RL210

Position information is provided by a resolver (AVG Autotech's dual resolver, RL210 with 128:1 gear ratio, or equivalent). The resolver is mounted to the Press Shut-Height Adjustment Drive Train (through some gears, if required).


(Position)
RL 210 Resolver (128:1)
(RE) Remote Enable
(PE) Program Enable
(RS) Remote Start
(Quantum-Only)
5-Bit Die I.D. Input
To PLC Backplane
Communicates with Backplane Through I/O Registers
6 IN / 6 OUT Quantum PLC
12 IN / 12 OUT A120 PLC
Setup & Status Data
Plug-in Module
UP-Energized to move the slide upward (increase position)
DOWN-Energized to move the slide downward (decrease position)
USL-Deenergized when upper safety limit of slide is exceeded
LSL-Deenergized when lower safety limit of slide is exceeded
DRIFT-Deenergized when slide position is too far from programmed position
BW-Deenergized when position transducer is not functioning or has a broken wire
FAULT-Energized when system is OK deenergized for FAUL
NO MOTION FAULT-Deenergized when motor is activated but resolver is not moving

M7350-RSHC

M7350-RSHC Shut-Height Control Module (cont.)

Specifications

Card Location:
Uses one PLC slot (any location)

PLC Communication:
Through input and output registers; allocate 12 input and 12 output registers for Modicon 984 Compact, 6 IN, 6 OUT for TSX Quantum.

Customer (Input Power):
24 VDC ±15% @ 100 mA

Position Transducer:
Dual Resolver-Autotech Series RL210 (128:1 gear), or equivalent

Position Information:
Available in two registers.

Upper and Lower Travel Limits:
True within travel range. False when above or below travel range.

INPUTS:

Active:
Contact closure to power supply common (Vs-); or a solid-state sinking output with less than 0.8 V drop @ 10 mA.

Inactive:
Open or power supply positive (Vs+).

PE (Program Enable): Must be active to program.

RE (Remote Enable): (5-bit) When active, up to 32 Die Setups can be selected. Also, enables Remote Start Input.

RS (Remote Start-Quantum only) When switched active, the automatic die positioning sequence is initiated.

OUTPUTS:
All outputs NPN sinking, 30 VDC max. @ 100 mA. AVG Autotech offers a compatible relay output chassis that can be used for power outputs.

Motor Up: Energized to move die upward (increasing position).

Motor Down: Energized to move die downward (decreasing position).

USL: Deenergized when Upper Safety Limit is exceeded (must be larger than LSL).

LSL: Deenergized when Lower Safety Limit is exceeded (must be smaller than USL).

Drift: Deenergized when die position is outside the programmed position.

BW: Deenergized either when position transducer is not functioning or has a broken wire.

Fault: Fault output energized only when system is functioning properly.

No Motion Error: Energized when Motor is ON and motion is not detected for longer than 1 sec.

How to Order

The **M7350-RSHC** employs an **ASY-RLYCH-08RL** Remote Relay Chassis for connection up to eight external devices, such as motors, that have a higher current draw than the RSHC module can accommodate. It is necessary to order the Remote Relay Chassis, up to eight **KSD-012DC-10A** electromechanical relays, and one **CBL-RLYCH-D04** connecting cable. (See below for details.)

M7350 Shut-Height Control Module—

SAC - xx 105 - MN000
1

1:	PLC Type	Substitute for xx from the following:
	MD	Modicon 984-A 120 Compact
	TX	Modicon TSX Quantum

Note: Slave Modules share a resolver with other devices. To order either module as a slave unit, substitute **S** for **M** in the part number.

Example:
SAC-TX105-MN000

The above part number specifies a master M7350 dual-resolver-based Shut-Height Control (fully absolute) module with NPN sinking transistor output for use in a Modicon TSX Quantum PLC.

All of the above units require a dual (multiturn) resolver as an input device, such as Autotech's RL210 (128:1 gear) resolvers.

RELAY OUTPUT CHASSIS—

ASY-RLYCH-08RL
Relay Output Chassis with built-in power supply. It accepts current sinking inputs and provides eight KSD-012DC-10A SPDT electromechanical relay outputs. The M7350-RSHC provides outputs compatible with the Relay Chassis input requirements. Wiring between the M7350-RSHC module and Relay Output Chassis requires CBL-RLYCH-D04, a preterminated cable having a DB15 connector on one end.

For **220 VAC unit**,
change the "**Y**" in **ASY-xxxxx-xxx** to "**2**".

For **240 VAC unit**,
change the "**Y**" in **ASY-xxxxx-xxx** to "**4**".

Inputs: 50 mA current sinking
Outputs: Relay chassis accommodates electro-mechanical or solid-state relays.

ELECTROMECHANICAL RELAYS—

KSD-012DC-10A
120 VAC @ 10 A (resistive), SPDT

CABLE—

(For connection of relay chassis to the shut-height module.)

CBL-RLYCH-D04
15-conductor cable with overall foil shield, 4-ft length, DB15 connector on one end and open on the other.

M7450 Peak Tonnage Monitor Module

Cost-effective PLC plug-in load monitor allows complete integration of load information with PLC.

Features:

- **Monitors up to four sensors**
- **M7450-PT2N Peak Tonnage Module for up to 2 Sensors**
- **M7450-PT4N Peak Tonnage Module for up to 4 Sensors**
- **Sensors with built-in 4-20 mA output simplify wiring**
- **Built-in sensor integrity checks**
- **Programmable Over & Under Limits for Press Protection, Die Protection, and Process Trend**

For your local AVG Automation Distributor or Technical Support inside the U.S. call: 1-800-TEC-ENGR.

ModConnect®

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Load Monitoring

The Load Monitor Module is a PLC plug-in module designed to monitor loads on a mechanical press. The module measures load through the load sensors mounted on the load bearing members of the press. The module compares the measured load against user programmed limits for press protection, die protection, and process trends. If the measured load is outside the programmed limits, the module deenergizes the appropriate fail-safe output, which can be used to stop the press, warn the operator, and/or signal a supervisory control.

Integration & Flexibility

When used in a press control system that uses a PLC, the Module offers advantages over stand-alone solutions. Since the Module is plugged-in a Modicon PLC rack, the PLC has complete access to load monitoring information, including limits, alarms, actual tonnage, etc. The Module is setup through the PLC, and the setup can be easily backed up along with the rest of the PLC program. Once the load information is in the PLC, the user has more flexibility in using it. For example, it can be displayed on an operator interface, sent to a computer over the network, etc.

Load Sensors-4 to 20 mA

AVG Autotech uses industry standard strain-gage sensors to read tonnage, but the similarities to competitive products ends right here. AVG Autotech's sensors have a built-in amplifier to give a 4 to 20 mA output, available on a terminal block. Other sensors have an internally terminated cable coming out of the sensor. These have to be prespecified in length as the cable cannot be "spliced." AVG Autotech sensors can be connected to the M7450 via standard shielded cables.

Modicon 984 Compact PLC Plug-in Module

Modicon TSX Quantum PLC Plug-in Module

Counters Track Production

The module has two counters for counting the total number of parts, as well as the number of good parts made. A part is considered "Good" if it did not cause any alarm or fault during stamping.

Multiple Setup Storage Makes Job Changeover Easy

The M7450 Peak Tonnage Module can store up to 200 independent, user-defined setups. It can also accept a PLC command to select a setup.

M7450 Peak Tonnage Monitor Module (cont.)

Specifications

Card Location:
Uses one slot (any location) PLCs

PLC Communication:
Through input and output registers; allocate 12 input and 12 output registers for Modicon 984 Compact; 6 IN, 6 OUT for TSX Quantum.

Operating Temperature:
32 to 130 °F (0 to 55 °C)

Tonnage Sensors:
AVG Autotech's SAC-M1030-SEN strain gage sensor provides 4-20 mA signal for tonnage. (Existing strain gages may be used with AVG Autotech's SAC-M1030-SENA amplifier.)

Number of Sensors:
M7450-PT2N—2 sensors
M7450-PT4N—4 sensors

Counters:
Two-Total Number of Hits and Number of Good Parts

Position Transducer:
Resolver. AVG Autotech's Series RL100 or E7R

Resolver Cable:
CBL-10T22-xxxx, 22 AWG, 5 twisted pairs, overall foil shielded cable.

Resolver Cable Length:
2,500 ft (762 m) max. shielded twisted-pair.

PROGRAMMABLE LIMITS:
Six limits for each installed sensor. The Limit comparisons can be selectively disabled, except for Positive Tonnage Press Limit.

Positive Tonnage Press Limit:
Programmed in Tons for Press Overload Protection-cannot be disabled.

Negative Tonnage Press Limit:
For Snap through or Reverse tonnage protection—can be disabled.

Die Protect Band:
Defined by Die Protect High and Low Limits. Both limits programmed as deviation from Reference Tons, either in Tons or in Percent of Reference Ton Value (choice is programmable)—comparison can be disabled.

Process Trend Band:
Defined by Process High and Low Limits. Both limits programmed as deviation from Process Base Tons, either in tons or in percent of the Base Tons-comparison can be disabled. (Process Base Tonnage is the running average of tonnage measured over the last several cycles; number of cycles for averaging is programmable.)

Offset Limits:
The sensor signal in the idle state should be around 4 mA. If the sensor signal wanders outside offset limits, and Offset Fault will be generated indicating that for some reason (broken wire, mechanical damage, etc.) the offset reading has been changed and needs to be corrected.

High Offset Limit restricts the maximum Positive Press Protect Limit.

Low Offset Limit restricts the maximum Negative Press Protect Limit.

Also, when either Offset Limit setting is violated (signal outside the limits) both the Under Die/Process Output and Over Die/Process Output will deenergize.

CONTROL INPUTS:

Program Enable:
Input must be TRUE to change any value.

Press Cycle Input:
A FALSE-to-TRUE transition signifies end of a press cycle. Input should occur ±10° of TDC.

OUTPUTS:
Four transistor outputs—all outputs are fail safe.

Positive Tonnage Press Limit—
Output deenergizes if Measured Tonnage exceeds Positive Tonnage Press Limit.

Negative Tonnage Press Limit—
Output deenergizes if Measured Tonnage exceeds Negative Tonnage Press Limit.

Over Die/Process Limit—
Output deenergizes if Measured Tonnage is greater than Die and/or Process High Limit.

Under Die/Process Limit—
Output deenergizes if Measured Tonnage is less than Die and/or Process Low Limit.

I/O ELECTRICAL SPECIFICATIONS:
Customer supplied 24 VDC power (Vs+, Vs-): 20 to 30 VDC @150 mA + current used by user's loads and inputs.

N-CHANNEL SINKING OUTPUT:

Output Logic Levels:
Logic TRUE:
MOSFET ON, 0.2 V Max. @ 100 mA
Logic FALSE:
MOSFET OFF, 0.05 mA leakage @ 30V
Max. Current per Output: 600 mA
Max. Current per Card: 2 A
Output Isolation: 1,500 V

Input Logic Levels:
Logic TRUE: 6-30 VDC
Logic FALSE: 0-1.5 VDC
Input Isolation: 1,500 V

Sensor Outputs: 4-20mA

Alarm Outputs: . . . . . four

M7450 Peak Tonnage Monitor Module (cont.)

How to Order

Using an M7450 Peak Tonnage Module System with your Modicon PLC requires three components:

M7450 Peak Tonnage Module—

SAC - xx 108 - MN x 00
1 2

1: **PLC Type** Substitute for **xx** from the following:

MD Modicon 984-A 120 Compact
TX Modicon TSX Quantum

2: **Number of Sensors** Substitute for **x** from the following:

2 2 sensors
4 4 sensors

Note: Slave Modules share a resolver with other devices.
To order either module as a slave unit, substitute **S** for **M** in the part number.

Example:
SAC-TX-108-M 0000

The above part number specifies a master M7450- PT2N 2-channel peak tonnage monitor module for use in a Modicon TSX Quantum PLC.

All of the above units require a single-turn resolver as an input device, such as Autotech's RL100 or E7R resolvers.

Sensors—

SAC-M1030-SEND Sensor, protective cover, amplifier (4-20 mA sourcing output) with drill kit for mounting sensor by drilling holes in the column.

SAC-M1030-SENW Sensor, protective cover, amplifier (4-20 mA sourcing output) with weld pad kit, for mounting sensor by welding the pads.

Interconnecting Cables—

CBL-10T22-xxx Shielded cable for the sensor wiring to M7450 Peak Tonnage Monitor Module: 22 AWG, 10 conductor (5 twisted pairs) overall foil shielded cable :

xxx =	**Length**	**and increments of 50 ft., etc.**	
010	10 ft. (3.1 m)	**100**	100 ft. (30.5 m)
020	20 ft. (6.1 m)	**150**	150 ft. (45.7 m)
050	50 ft. (15.2 m)	**200**	200 ft. (61.0 m)

Touch•PLS—Touchscreen PLS

A New Horizon in Programmable Limit Switches

Features:

- **Touchscreen PLS and Graphical Operator Interface in one unit**
- **Three screen sizes available: 5" Color, 6" Monochrome, or 10" Color**
- **Most Advanced PLS with Leading- and Trailing-Edge Speed compensation**
- **PLS Settings and Machine Data Totally Integrated with Your PLC**
- **Programmable Graphical Interface to Modicon PLCs**

Touch•PLS is a traditional PLS that's been combined with a touchscreen-based Graphical Operator Interface. No longer do you have to contend with LEDs, switches, pushbuttons, and keypads. Touch•PLS graphically depicts your application, while providing machine settings and status and production data. All programming and fine-tuning of the PLS settings occurs in a Windows-type environment. While the unit comes with predesigned screens, AVG Automation's *u*WIN software makes it easy to create or customize screens to suit your particular application.

One size fits all!

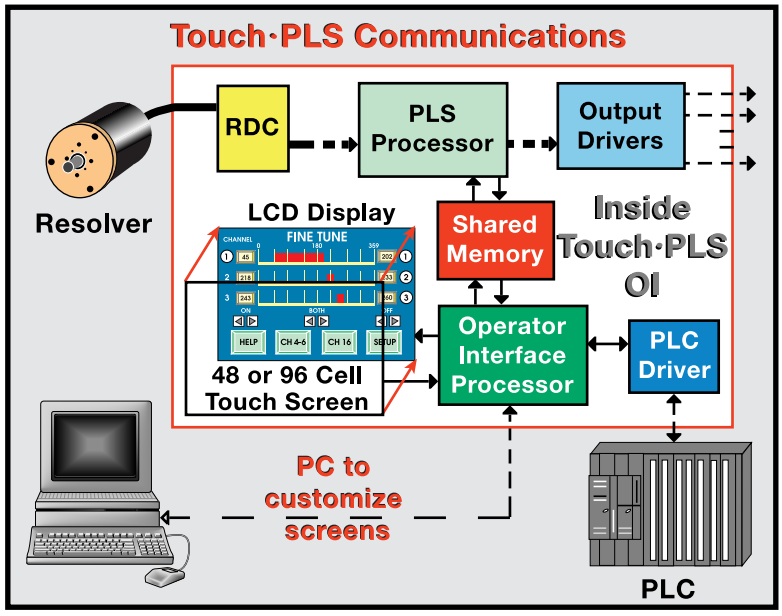
You don't need separate PLS and PLC operator interfaces when you use Touch•PLS because it does double duty; serving as a PLS interface/control as well as an operator interface to the PLC. There's no need to clutter up your machine's operator panel with several different displays when Touch•PLS does it all! It reduces panel space, which also reduces installation costs and hardware costs.

Touch•PLS Principle of Operation

The Touch•PLS, as shown in the block diagram, uses two processors, one for the PLS and the other to manage, display, and communicate to the PLC. The PLS processor reads its position signals from the resolver mounted on the machine's shaft. It controls position-based outputs independent of the interface processor, providing fast repeatable outputs. The PLS processor and the interface processor share information using a 1,024-register shared memory. The dynamic information, such as position, RPM, and output status, is available to the interface processor for display through registers.

The interface processor also shares data with the connected PLC through a second set of 1,024 registers.

This arrangement makes it easy to display data from both the PLC and PLS *on one screen*. In addition, 32 registers (16 in each direction) are used to exchange time-critical information between the PLS and PLC through the interface processor. These registers can be used to send position, RPM, and output status information to the PLC.



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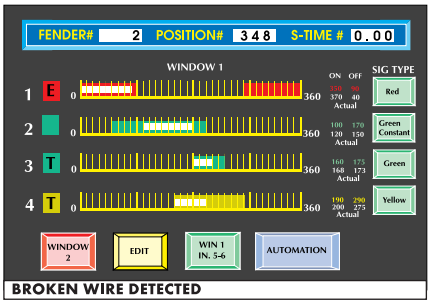
ModConnect®

AVG is proud to be a Modconnect Partner

Rugged, Reliable Resolver for Position Tranducer



The Touch•PLS uses a resolver as a position transducer. Unlike incremental encoders, the resolver, along with its noise-immune ratiometric converter, always gives true machine position—even if the machine moved during a power outage. The resolver, due to its construction, is immune to temperature and humidity extremes and mechanical shocks and vibrations.

Short-Circuit-Proof Resolver

The Touch•PLS uses AVG Autotech's standard short-circuit-proof resolver circuit. Thus, in case of an accidental short in the resolver wiring, costly damage to the PLS resolver decoder and the resulting downtime is avoided.

Broken-Wire Detection

The Touch•PLS features a broken resolver-wire detector to supervise the resolver input signal. The broken-wire detector will signal the fault output if the resolver is missing any signals.

Features:

Highest Processing Speed

Touch•PLS uses AVG Automation's patented DMA technique, which converts the resolver's analog output signal to a digital form, then compares all the setpoints, and activates all the outputs in less than a millisecond. The high-speed ratiometric resolver-to-digital converter and the microscan time guarantees perfect machine operation at speeds up to 1,800 RPM.

Leading- and Trailing-Edge Speed Compensation

Touch•PLS features a Speed Compensation (Rate Offset) to compensate for speed variations. The Rate Offset, individually programmable for each channel, is used to advance the PLS settings as a function of the machine speed. In addition, it has 4 channels that have Multislope Speed Compensation, programmable in 16 zones.

Pulse Programming

Touch•PLS can be fine-tuned while your machine is running. Either or both of the ON and OFF Setpoints can be incremented or decremented, or a fixed dwell can be incremented or decremented, as needed.

Angle ON—Time OFF

Touch•PLS can be programmed to have its outputs turned ON at an angle and turned OFF after a programmed time by touching the screen. For example, Channel 12 can be turned ON at an angle of 100° and stay ON for a period of 2.45 seconds.

Programmable Functionality: Brake Wear and Mod-Z

Touch•PLS features a dynamic zeroing or Mod-Z (Modification Zero) to modify the zero reference point, independent of the actual resolver position. After the PLS receives the Mod-Z input, the resolver position is reset to zero. Touch•PLS can also perform Brake Wear Monitoring to satisfy the OSHA requirement. This PLS can be field programmed to have Brake Wear Monitoring Functionality (initiated by entering a Caution and Danger limit). If you do not select Brake Wear Monitoring, the user must select Mod-Z or the unit defaults to normal PLS functionality. (If Brake Wear is selected, the unit cannot function as Mod-Z.)

Flexible Group Assignment

Touch•PLS's Flexible Group Assignment can be a powerful and useful feature. When it is desirable to control several different machines linked to the same drive shaft, output channels may be grouped together into one of five independent sections. The base group is always PLS, while the other four groups (1-4) may be defined as PLS or Mod-Z type. Each PLS group has its own group offset, while each Mod-Z group has its own Mod-Z inhibit zone.

Built-in Motion Detector and Tachometer

Touch•PLS has a built-in tachometer and motion detector. The motion detector energizes a relay when the RPM is between the programmed low and high alarm values.

8-Levels of Password Protection

Touch•PLS has a password protection feature eight levels deep. Up to eight different passwords that are user-programmable from the touchscreen, allow access to different screens in the Touch•PLS, providing ultimate protection and security of machine settings.

Touch•PLS has Choice of 4 Displays

Touch•PLS offers four different types of flat panel touchscreen displays to suit any application and its budget. Except for the size and availability of colors on the screen, all other features remain the same.

5" Color

The 5" color LCD model offers 16 colors, high contrast, 320 x 240-pixel resolution, and an 8 x 6 touch-cell grid.

5" Color

The 5" active matrix color LCD model offers 16 bright colors, high contrast, 320 x 240-pixel resolution, and an 8 x 6 touch-cell grid.

6" Monochrome

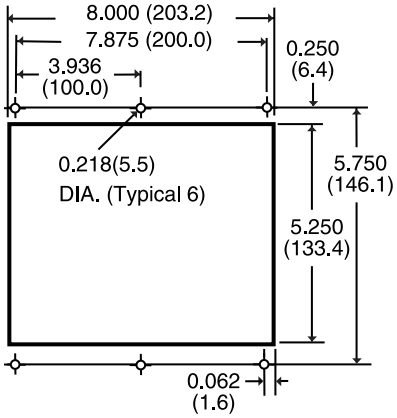
The 6" monochrome model provides 320 x 240-pixel resolution with three shades of gray and an 8 x 6 touch-cell grid.

Display	Size	Resolution (pixels)	Touch Cells	Shades/ Colors	Enclosure Ratings
Color (Active)	5"	320 x 240	8 x 6	16	NEMA 4
Color	5"	320 x 240	8 x 6	16	NEMA 4
Monochrome	6"	320 x 240	8 x 6	3	NEMA 4, 4X
Color (Active)	10"	640 x 480	16 x 12	16	NEMA 4X

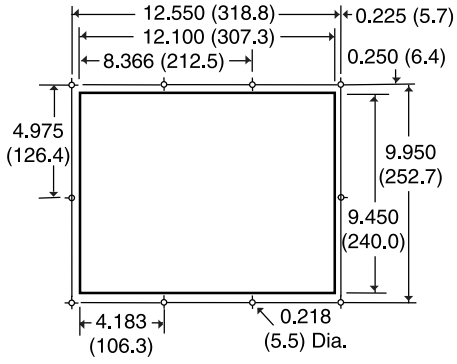
10" Color

The 10" color model comes with a bright 640 x 480-pixel resolution, 16-color, flat panel display, and a 16 x 12 touch-cell grid.

MOUNTING DIMENSIONS



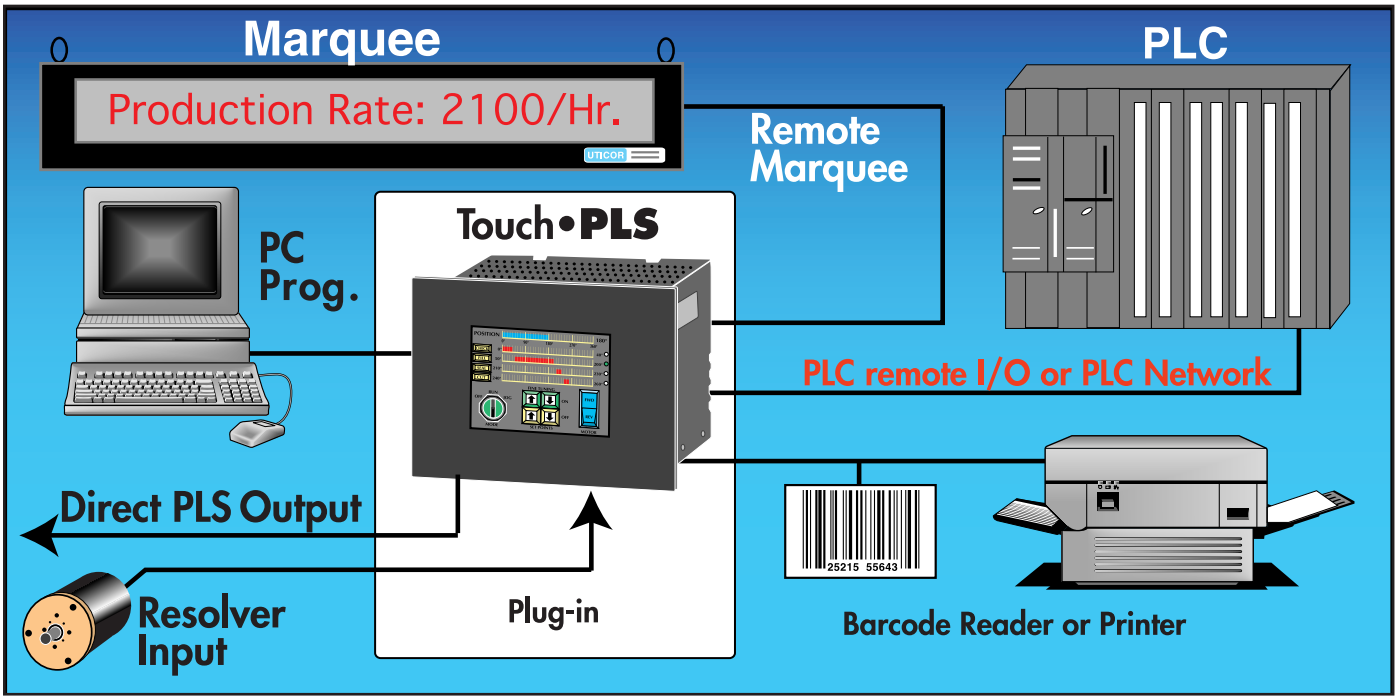
Panel Cutout for 5" and 6" units



Panel Cutout for 10" unit

Touch•PLS — Total Integration with any PLC Network...

Until the advent of Touch•PLS, the only way you communicated your machine position, speed, or PLS status to your PLC network, was through hard-wired discrete outputs from the PLS to the PLC inputs. As far as the PLS program settings were concerned, they were simply not available to the PLC. Touch•PLS can communicate to Modicon PLCs using a Modbus Plus network. Thus, the entire PLS program can be either uploaded or downloaded to the PLC through this connection. PLS status can also be fed to the PLC through the same Modbus Plus connection. Hard PLS outputs are also available to activate the machine solenoids directly.



Touch•PLS Eliminates the Need for a Separate Operator Interface for your Modicon PLC

Touch•PLS is a complete Graphical Operator Interface (OI) for the Modicon PLC in your system. Therefore, you do not need another OI for the PLC if you are using Touch•PLS. It can communicate to your Modicon PLC, even while performing PLS functions.

The OI part of Touch•PLS is more than a pushbutton replacement. It offers functionality not possible with other discrete operator panels. Not only can it replace common panel components, such as pushbuttons, pilot lights, selector switches, etc. very economically, but you also have complex flexibility. With Touch•PLS, your control panel is never obsolete. Any changes can be made in minutes on-line, off-line, or even remotely.

The operator can't push the wrong button

Touch•PLS panels display only the necessary controls that are needed for a particular function, and only when they are needed. Thus, not only can the machine's control panel be made far less cluttered; but, controls that are not needed at that moment are simply not available to the operator. This reduces possible operator confusion. And by locking out the operator's ability to touch the wrong control, using Touch•PLS minimizes or eliminates damage—and the resulting cost—that could be caused by introducing inappropriate control signals to the machine.

Specifications

Power Requirements:
- **5" and 6" Models:**
  24 VDC
- **10" Color Model:**
  120 VAC ±10%, 50-60 Hz, or 24 VDC

Operating Temperature:
All Models: . . . . 32 to 122 °F (0-50 °C)
Position Resolution: . . . 1 part in 1,000
Update Time: . . . . . 1.5 msec

PROGRAMMABLE PARAMETERS:
Scale Factor:
Programmable from 16 to 999, common to all PLS setup
Position Offset:
Programmable to full scale factor value, common to all PLS setup
Number of PLS On/Off Set points:
112 per PLS setup
Number of PLS Setups: 8
Speed Compensation:
Leading and Trailing edge, programmable in scale factor units per 100 RPM, up to full-scale factor value. Each PLS output (channel) has its own speed compensation
Brake Monitor:
Caution and Danger Limit, Stopping time 9.99 sec. max.
Motion Detector:
Low and High motion limits, common to all PLS setups, programmable from 0-999 RPM

Number of PLS outputs: 16
Dynamic Zero or Mod-Z Input or Brake Input:
Modification Zero on the fly with an external input (edge triggered) or brake input
Serial Communication:
via RS-485A port
Broken Resolver Wire Detection:
Indication for broken wire in I/O Status

RESOLVER INTERFACE:
Position Transducer:
Resolver, Autotech's Series RL100, E7R and E8R.
Resolver Cable:
Autotech's CBL-10T22-CXXX or CBL- 10T22-MXXX.
Resolver Decoder:
Ratiometric, tracks resolver shaft angle up to 1,800 RPM.
Cable Length:
2,500 ft., shielded, twisted-pair.

INPUTS/OUTPUTS:
Electrical Specifications:
Service Power:
Customer supplied 24 VDC or 115/230 VAC
I/O Power Input:
20 to 30 VDC @ 100 mA + user's loads

N-Channel Sinking Input

OUTPUT LOGIC LEVELS:
Logic True:
MOSFET ON, 0.2 V Max. @ 100 mA
Logic False:
MOSFET OFF, 0.05 mA leakage @ 30 V
Max. Current per Output: . . . . . 600 mA
Max. Current per Card: . . . . . 2 A
Output Isolation: . . . . . 1,500 V

INPUT LOGIC LEVELS:
Logic True: . . . . . 6-30 VDC
Logic False: . . . . . 0-1.5 VDC
Input Isolation: . . . . . 1,500 V

P-Channel Sourcing I/O

OUTPUT LOGIC LEVELS:
Logic True:
MOSFET ON, 0.5 V Drop @ 100 mA
Logic False:
MOSFET OFF, 0.05 mA leakage @ 30 V
Max. Current per Output: . . . . . 600 mA
Max. Current per Card: . . . . . 2 A
Output Isolation: . . . . . 1,500 V

INPUT LOGIC LEVELS:
Logic True: . . . . . 6-30 VDC
Logic False: . . . . . 0-1.5 VDC
Input Isolation: . . . . . 1,500 V

100GT Touch•PLS—Touchscreen PLS (cont.)

How to Order

Part Number	Description
100GT xx 1R4 x 1 2	Touchscreen-based PLS

1 = Screen Size/Color

5S	5" Color LCD
5A	5" Active Matrix Color LCD
5L	6" Monochrome LCD
1S	10" Color LCD

2 = Outputs

K	8 NPN PLS Outputs + 8 Internal PLS Outputs through PLC
M	8 PNP PLS Outputs + 8 Internal PLS Outputs through PLC
L	16 NPN PLS Outputs
N	16PNP PLS Outputs

Example:
100GT5L1R4N

The above part number specifies a Touch•PLS with a 6" Monochrome LCD and 16 PNP PLS Outputs.

Miscellaneous

10F64 uWIN Programming Software

MAN-M7251-001 User's Manual

28417 3.6 V Coin Cell Lithium Battery (5" & 6" Models)

28421 1/2 AA, 3.6 V Lithium Battery (10" Models)

All of the above units require a single-turn or single-turn geared resolver as an input device, such as Autotech's RL100 or E7R resolvers.

Programmable Message Displays

Introduction

AVG Uticor Programmable Message Displays (PMDs) can be found in numerous applications throughout all industries. PMDs are extremely versatile products, enabling your Modicon PLC or control system using Modbus, Modbus Plus, or Modbus Remote I/O, to display vital production status or alarm messages to plant-floor personnel in real time.

AVG Uticor offers three lines of human-machine interfaces:

1. **VFD (Vacuum Fluorescent Display), Character-based message displays**
2. **LED-based Marquees (description starts on page 69)**
3. **PowerPanel Touchscreen-based Flat-Panel Graphical operator interfaces (description starts on page 92).**

AVG Uticor VFD Character-based message displays come in three configurations—Master Message Display, Message Controller, and Slave Message Display. Discussion that follows will clarify the function of each type of product:

Master Message Displays store several (memory dependent) messages. These messages and their characteristics (such as blinking, centering, scrolling, etc.) are programmed using a programming software (runs on a PC) available ***free*** from AVG Uticor. A Master Message Display continuously polls the connected PLC for a message number and several control parameters. (PMD 375 & 475 PLC interfaces function in four modules. The first mode polls a specific range of holding registers in the PLC. The second mode puts the PMD 375/475 in the position of being a slave device on the ModBus Plus Network. In this mode, the PMD 375/475 will only reply to commands it receives. The PMD 375/475 will not initiate any transactions on the ModBus Plus Network. The fourth mode supports a ModBus Plus node sending ASCII data to the PMD 375/475 and receiving replies to the ASCII commands that it sends.) Based on the control parameters, the Master Message Display can display the message, send the message to one or a group of Slave Message Displays (described below) over Uticor Slave Network. A PC can also control the Master Message Display.

Master Message Displays come in two configurations

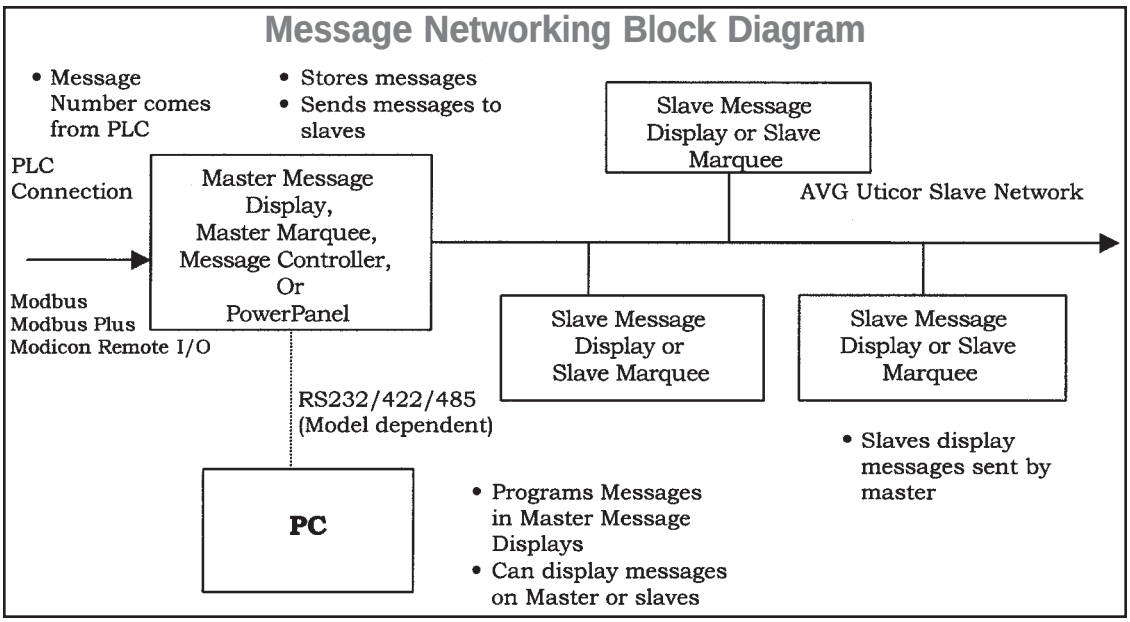
- (Displays only-no keypads), such as AVG's PMD 180, PMD 370, and PMD 375
- (Displays and keypads), such as: AVG's PCI 185, PCI 185E, PMD 470, and PMD 475 Models.

A Message Controller is functionally the same product as the corresponding Master Message Display, *except it has no display of its own*. Thus, a Message Controller, like Master Message Display, stores messages and sends these messages to Slave Message Displays or Slave Marquees (to one, group, or broadcast), based on PLC and/or PC command.

PMD Message Controllers include the PMD 180MC, PMD 370MC, and PMD 375MC Models.

Slave Message Displays do not store messages. They are typically used with a Master Message Display, Message Controller, Master Marquee, or PowerPanel. A Master Message Display, Message Controller, Master Marquee, or PowerPanel can drive a network of several Slave Displays. Each Slave Display used on a network has a unique address. The addressing scheme allows for a message to be sent to one, several, or all slaves on the network.

Slave Message Displays include PMD 180S, PMD 200S, and PMD 300S.


Message Networking Block Diagram
• Message Number comes from PLC
• Stores messages
• Sends messages to slaves
Slave Message Display or Slave Marquee
PLC Connection
Master Message Display, Master Marquee, Message Controller, Or PowerPanel
AVG Uticor Slave Network
Modbus
Modbus Plus
Modicon Remote I/O
Slave Message Display or Slave Marquee
Slave Message Display or Slave Marquee
RS232/422/485 (Model dependent)
• Slaves display messages sent by master
PC
• Programs Messages in Master Message Displays
• Can display messages on Master or slaves

Programmable Message Displays Introduction (cont.)

Selecting the right model

The PMD Master Message Display or Message Controller receives message inputs from a Modbus, Modbus Plus, or Modicon Remote I/O source and outputs messages to one or more slave units installed at strategic locations throughout the user's plant. A PC can be connected for programming purposes.

AVG offers a variety of PMD models to meet different application needs. A user will select a PMD based on following criteria:

- **Number of lines on display**
- **Characters per line**
- **Size of characters (visibility distance)**
- **PLC Connectivity**

Below is a table to help you select right model for your application based on the above criteria. In addition to above characteristics, PMDs offers a wide variety of features. A list of features is given later in this section. Please refer to data sheets of each model for more information on a model.

FEATURES	PMD COMPARISON											
	MODEL	PLC CONNECTION			DISPLAY				OPERATOR INTERFACE			PAGE
		MODICON S908 REMOTE I/O	MODBUS	MODBUS PLUS	CHARACTER SIZE (mm)	LINES	CHARACTERS PER LINE	DISTANCE (ft.)	KEYPADS	FUNCTION KEYS	USER-PROGRAMMABLE LEDS	
MASTER DISPLAYS	(DISPLAYS ONLY--NO KEYPADS)											
	PMD 180		X		5	2/4	20/40	10	--	--	--	50-51
	PMD 370	X			12.5	4	20	25	--	--	--	52-53
	PMD 375			X	12.5	4	20	25	--	--	--	52-53
	(DISPLAYS AND KEYPADS)											
	PCI 185		X		5	2/4	20/40	10	X	16	16	54-56
	PCI 185E		X		5	2	20	10	X	16	16	54-56
	PMD 470	X			9.1	4	20	15	X	16	16	57-58
	PMD 475			X	9.1	4	20	15	X	16	16	57-58
MESSAGE CONTROLERS	(NO DISPLAYS)											
	PMD 180MC		X		--	--	--	--	--	--	--	59-60
	PMD 370MC	X			--	--	--	--	--	--	--	61-62
	PMD 375MC			X	--	--	--	--	--	--	--	61-62
SLAVE DISPLAYS	PMD 180S	--	--	--	5	2/4	20/40	10	--	--	--	63-64
	PMD 200S	--	--	--	11	2	20	20	--	--	--	65-66
	PMD 300S	--	--	--	12.5	4	20	25	--	--	--	67-68

PMD Features

AVG Uticor's Human-Machine Interfaces offer many features that enhance your ability to display pertinent information. Here's a brief listing of some of the more common features and what they are (Every model may not support all of the following features):

Blinking

A character, word, or message flashes on and off at a user-programmable rate; used to attract attention to a message of high priority.

Chained Message

Links up to 115 individual messages together and displays at a user-defined rate.

Circular Message Queue

A list of messages displayed in the order that they are triggered according to their message display time. The list wraps around from the last message back to the first message and continues to cycle through the queue until the user makes a change.

Data Log

An area of memory set aside for a time- and date-stamped historical record of events in the unit.

Invisible Messages

Messages sent to a printer or Slave Message Display, but not to the Master Message Display's own display.

Off-line Programming

Message programs are developed with AVG Uticor software and stored to disk. The message file can then be uploaded to the Master Message Display unit. The computer does not need to be connected to the unit for this programming process.

On-line Programming

Master Message Display unit is programmed directly from the computer. The unit must be connected to the programming computer. With on-line programming, the user can develop screens while the display unit is running. This allows modification of the screens without having to take the unit off line.

Real-Time Clock

A clock that indicates the passage of actual time.

Scrolling Message

A message that contains up to 235 characters and moves from the bottom of the display to the top, or from the right of the display to the left.

PMD 180

Programmable Message Display for Modbus

Features:

- **2 x 20, 2 x 40, or 4 x 20 character display**
- **5x7 dot matrix characters, 10 ft (3.05 m) viewing distance**
- **Message priority & queue to 16 messages**

Advanced Features:

- **Power & Battery Status LEDs**
- **Display time, date, variable data**
- **Scroll, chain, blink, print, log, & center messages**
- **Message Memory: 8-128K, RAM or EEROM**
- **115/230 VAC (standard), 24 VDC (optional)**
- **UL Listed, CSA Approved FM Division I, Class 2, Groups A, B, C, D**
- **Front Panel: NEMA 12 (standard), NEMA 4X Stainless Steel (optional)**

Compatibility:

Slave Message Displays:
- PMD 180S
- PMD 200S
- PMD 300S

Slave Marquee Dipslays:
- PMD 1100
- PMD 1200
- PMD 1205
- PMD 1404
- PMD 1406
- PMD 3000
- PMD 3500

For your local AVG Automation Distributor or Technical Support inside the U.S. call: 1-800-TEC-ENGR.

ModConnect®

AVG is proud to be a Modconnect Partner

AVG Uticor's PMD 180 is a compact and versatile 2- or 4-line display with 20 or 40 vacuum fluorescent characters per line 0.197" (5 mm) high. Parameters are set up with front panel pushbuttons. The unit features direct connection to Modicon Modbus-based PLCs. This product features chaining, blinking, scrolling, printing, and centering messages. Hardware features include data logging, 16-message queuing with prioritization capability, and the ability to program messages in U.S., English, Swedish, French, Danish, German, Cyrillic, and Japanese Kana international character sets.

Any ASCII terminal or personal computer (running 10F54 software) with an RS-232C interface can be used to program a whole network of message displays. AVG Uticor's ***free*** custom software (part number 10F54) provides the menus, prompts, and help screens that make message entry and editing easy... And, the message simulation feature lets you see your messages as they will appear on your AVG Uticor PMD180.

Specifications

MECHANICAL

Weight: . . . . . 4.5 lb. (2.04 kg)

Dimensions:
See drawing—inches (mm)

DISPLAY

Display Technology:
Vacuum Fluorescent

Lines: . . . . . 2 or 4

Characters per line: . . . . . 20 or 40

Character: . . . . . 5x7 Dot Matrix

Viewing Distance: . . . . . 10 ft. (3.05 m)

ELECTRICAL

Message Memory: . . . . . 8-128 Kbytes

Slave Port: . . . . . Optional

Computer Port: PMD or ASCII Protocol

Interface Port: RS232

Parallel Port Inputs: . . . . . 20 (optional)

Parallel Port Source Inputs: 10-30 VDC

Printer Port: . . . . . Optional

Power Source:
115 VAC (102-132),11 VA, 47-63 Hz
230 VAC (194-250), 11 VA, 47-63 Hz

Electrical Interference:
NEMA ICS 2-230 Showering Arc Test

Electrical Tolerance:
ANSI C37.90a-1974 (SWC)
Surge Withstand Capability Test

ENVIRONMENTAL

Temperature (Ambient):

- **Operational:**
  32 to 140 °F (0 to 60 °C)
- **Storage:**
  -40 to +203 °F (-40 to +95 °C)

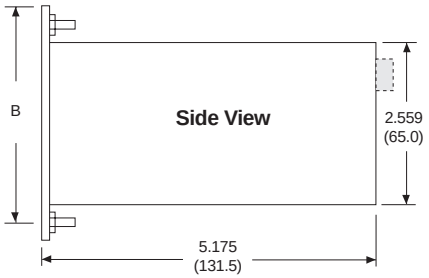
Humidity:
10 to 95% RH, Noncondensing

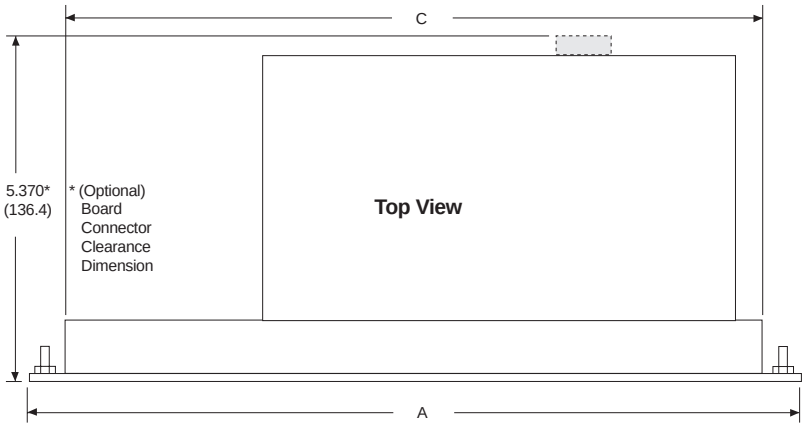
Enclosure Rating: . . . . . NEMA 12

PMD 180 Series Master Display (cont.)

Dimensions

PMD 180	NEMA	A	B	C
4 Line/20 Character	**12**	8.650 (219.7)	3.700 (94.0)	8.150 (207.1)
2 Line/40 Character	**12**	11.550 (293.4)	3.700 (94.0)	10.984 (279.0)
4 Line/20 Character	**4X**	9.150 (232.4)	4.200 (106.7)	8.150 (207.1)
2 Line/40 Character	**4X**	12.050 (306.1)	4.200 (106.7)	10.984 (279.0)
2 Line/20 Character	**4X**	9.150 (232.4)	4.200 (106.7)	8.150 (207.1)





How to Order

Part Number Description

180 - xxx x x xxxx x 2- or 4-line Master Message Display
1 2 3 4 5

1:	**Model:**	Substitute for **xxx** from the following:
	22A	Display with two lines x 20 characters
	24A	Display with two lines x 40 characters
	42A	Display with four lines x 20 characters
2:	**Voltage:**	Substitute for **x** from the following:
	1	115/230 VAC Power Supply
	2	24 VDC Isolated Power Supply
3:	**Bezel:**	Substitute for **x** from the following:
	N	NEMA 12 with Mounting Studs
	S	NEMA 4X Stainless Steel
	F	NEMA 12 Blank Front
4:	**Memory:**	Substitute for **xxxx** from the following:
	008E	8K EEPROM
	032E	32K EEPROM
	063E	63K EEPROM
	128E	128K EEPROM
	032R	32K RAM
	128R	128K RAM
5:	**Options:**	Substitute for **x** from the following:
	0	None
	1	Slave, Printer, and Parallel Port
	2	RS-485A Interface without Slave/Printer/Parallel Port

Example:

180-24A 1N032R 0

The Above part number specifies a PMD180 display with two lines x 40 characters x 0.197" (5 mm) high with 115/230 VAC power supply, NEMA 12 bezel with mounting screws, 32K RAM memory, and no options.

Miscellaneous:

28107	Fuse 0.5 A (for 24 VDC operation)
28110	Fuse 0.25 A (for 115/230 VAC operation)
28421	Battery 3.6 V (1/2 AA Lithium)
43932	25 to 9 pin programming cable for PMD 180 (RS-232C)
10F32	Data Log Analyzer Software
43962	RS-232C Programming Cable (9 to 9-PIN)
10F54	**FREE** Programming Software
79736	User's Manual

Enclosures — Consult Factory for Availability

PMD 370/375 Series Master Display

Programmable Message Display for Modicon PLCs

Features:

- **4 lines x 20 characters per line display**
- **Large 0.492" (12.5 mm) Character size, visible from 25 ft. (7.62 m)**

Advanced Features:

- **Stores approximately 175 80-character messages per 16K of EEPROM memory**
- **Internal data logger has battery-backed RAM for internal storage of over 3,000 messages**
- **Scroll, chain, blink, print, log, & center messages**
- **115/230 VAC (standard), 24 VDC (optional)**
- **UL Listed, CSA Approved FM Division I, Class 2, Groups A, B, C, D**
- **Front Panel: NEMA 12 (standard), NEMA 4X Stainless Steel (optional)**

Compatibility:

Slave Message Displays:
- PMD 180S
- PMD 200S
- PMD 300S

Slave Marquee Dipslays:
- PMD 1100
- PMD 1200
- PMD 1205
- PMD 1404
- PMD 1406
- PMD 3000
- PMD 3500

AVG Uticor's PMD 370 and PMD 375 are versatile 4-line displays with 20 vacuum fluorescent 0.492" (12.5 mm) high characters per line.

PMD 370 directly connects to Modicon PLCs that support S908 remote I/O. PMD 370 emulates a D908 module so that it can exchange data with the PLC. The PMD 370 is programmed as a specific drop number.

PMD 375 directly connects to a Modicon Modbus Plus local area network system. PMD 375 is a node on the network with its own network address, which allows it to exchange data with the PLC. The PMD 375 can be programmed to monitor PLC holding registers for message control, data set information, and LED control.

These products feature chaining, blinking, scrolling, printing, and centering messages. Hardware features include data logging, 115 chained-message queuing with prioritization capability, and the ability to program messages in U.S., English, Swedish, French, Danish, German, Cyrillic, and Japanese Kana international character sets.

Any ASCII terminal or personal computer with an RS-232C interface can be used to program a whole network of message displays. AVG Uticor's ***free*** custom software provides the menus, prompts, and help screens that make message entry and editing easy... And, the message simulation feature lets you see your message, as it will appear on your AVG Uticor PMD 370 or PMD 375.

For your local AVG Automation Distributor or Technical Support inside the U.S. call: 1-800-TEC-ENGR.

ModConnect®

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PMD 370/375 Series Master Display (cont.)

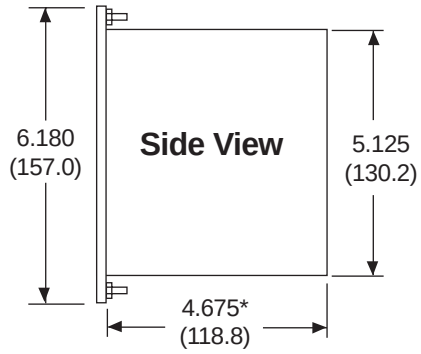
Specifications

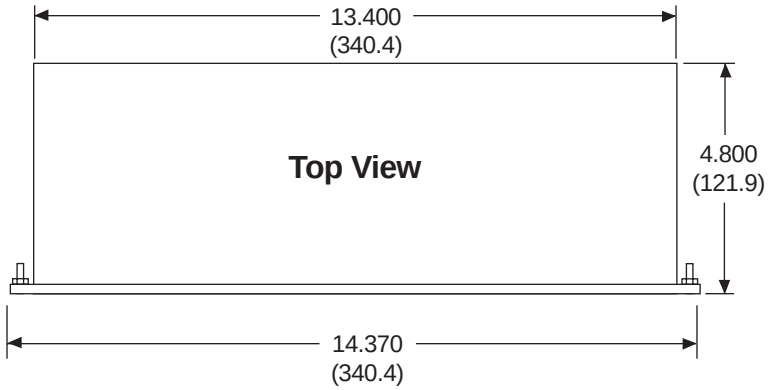
MECHANICAL
Weight: . . . . . 7.6 lb.(3.45kg.)
Dimensions:
See drawing—inches (mm)

DISPLAY
Display Technology:
Vacuum Fluorescent
Lines: 4
Characters per line: 20
Character Height: . . . 0.492"(12.5 mm)
Viewing Distance: . . . . . 25 ft.(7.63m)

ELECTRICAL
Message Memory: . . . . . 8-128 Kbytes
Slave Port: RS-422A
Computer Port: RS-232C
Printer Port: . . . . . Parallel
Power Source:
• **AC Model:**
115 VAC (102-132)
47-63 Hz (jumper select), 22 VA
230 VAC (194-250)
47-63 Hz (jumper select), 22 VA
• **DC Model:**
24 VDC (21.6-26.4), 10 VA
Electrical Interference:
NEMA ICS 2-230 Showering Arc Test
Electrical Tolerance:
ANSI C37.90a-1974 (SWC)
Surge Withstand Capability Test

Modicon PLC Connector:
(PMD 370)
Female coaxial connector
Modbus Plus Connector:
(PMD 375)
9-pin female "D"-style connector
ENVIRONMENTAL
Temperature (Ambient):
• **Operational:**
32 to 140 °F (0 to 60 °C)
• **Storage:**
-40 to +203 °F (-40 to +95 °C)
Humidity:
10 to 95% RH, Noncondensing
Enclosure Rating:
NEMA 12 (standard)
NEMA 4X (stainless steel)





How to Order

Part Number — Description

766 xx xx - xxx — 4-line Master Message Display
1 2 3

1: Model/Power Input: Substitute for **xx** from the following:

55	PMD 370, 115/230 VAC
56	PMD 370, 24 VDC
59	PMD 375, 115/230 VAC
60	PMD 375, 24 VDC

2: Enclosure Substitute for **xx** from the following:

Blank (no number)	NEMA 12
SS	Stainless Steel NEMA 4X

3: Memory Substitute for **xxx** from the following:

16	16K total message memory
32	32K total message memory
64	64K total message memory
128	128K total message memory

Example:

76655-16

The part number above describes a PMD 370 in a NEMA 12 enclosure, operating from 115/230 VAC, and having 16K memory.

Remote Operator Interfaces:

76801 PMD 400E
Remote Operator Interface:
32 function keys and 32 LEDs

76803 PMD 400Es
Remote Operator Interface:
16 function keys and 16 LEDs

58263 Remote Operator Station:
3 pushbuttons

Miscellaneous:

28105 Fuse 1.5 A (for 24 VDC oper.)
28106 Fuse 1.0 A (for 115 VAC oper.)
28107 Fuse 0.5 A (for 230 VAC oper.)
28421 Battery 3.6 V (1/2 AA Lithium)
10F50 Programming Software
43962 RS-232 (IBM PC to PMD) Programming Cable (25- and 9-pin programming)
79710 User's Manual

Enclosures — Consult Factory for Availability

Note: All units come with a user's manual. Software must be ordered separately or downloaded from the AVG Uticor web site at: http://www.avg.net

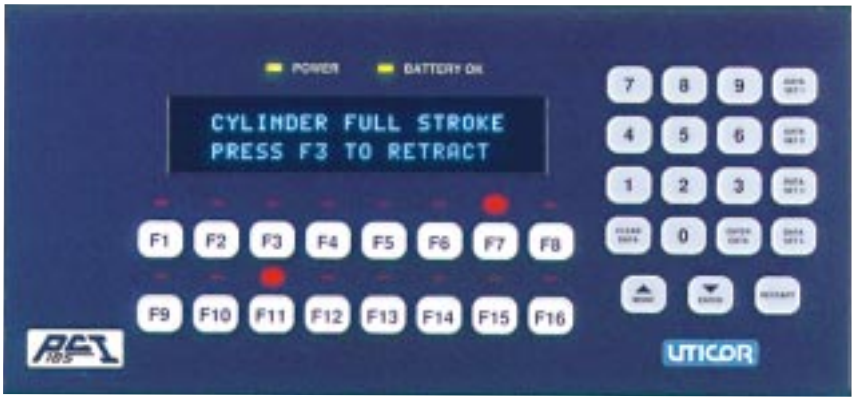
PCI 185/185E
Master Message Display for Modbus

Features:

- **Two-way communication between operator and machine**
- **5x7 dot matrix characters, 10 foot (3.05m) viewing distance**

Advanced Features:

- **Power and Battery Status LED Indicators**
- **16 User-Defined Function Keys featuring changeable legends**
- **Numeric Keypad for Data Entry**
- **Front Panel Setup Buttons, Mode, Enter, and Restart**
- **Real-time Clock and Data Logger**
- **Message Memory: 8-128K, RAM or EEROM**
- **115/230 VAC (standard), 24 VDC (optional)**
- **UL Listed, CSA Approved FM Division I, Class 2, Groups A, B, C, D**
- **Front Panel: NEMA 12 (standard), NEMA 4X Stainless Steel (optional)**



AVG Uticor's Programmable Communications Interface (PCI) displays provide two-way communication to various PCs and Modicon PLCs. Parameters are set up with front panel pushbuttons.

PCI 185 is a compact and versatile 2-line or 4-line display, with 20 or 40 vacuum fluorescent characters per line.

PCI 185E is a compact and versatile 2-line display, with 20 vacuum fluorescent characters. It is only available in 24 VDC and can come without the LED indicators (optional).

These units feature direct connection to Modicon Modbus-based PLCs. This product features chaining, blinking, scrolling, printing, and centering messages. Hardware features include data logging, message queuing with prioritization capability, and the ability to program messages in U.S., English, Swedish, French, Danish, German, Cyrillic, and Japanese Kana international character sets. Literally hundreds of messages can be stored in the PCI 185/185E and selected by the PLC for display of alarms, machine conditions, and operator prompting.

Any ASCII terminal or personal computer with an RS-232C interface can be used to program a whole network of message displays. AVG Uticor's ***free*** custom software provides the menus, prompts and help screens that make message entry and editing easy... And, the message simulation feature lets you see your messages as they will appear on your AVG Uticor PCI 185/185E.

For your local AVG Automation Distributor or Technical Support inside the U.S. call: 1-800-TEC-ENGR.

ModConnect®

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Compatibility:

Slave Message Displays:
PMD 180S, PMD 200S, PMD 300S

Slave Marquee Dipslays:
PMD 1100, PMD 1200, PMD 1205, PMD 1404, PMD 1406

PCI 185/185E Master Message Display (cont.)

Specifications

MECHANICAL

Weight: . . . . . 4.5 lb. (2.04 kg.)
Dimensions (inches):
See drawing—inches (mm)

DISPLAY

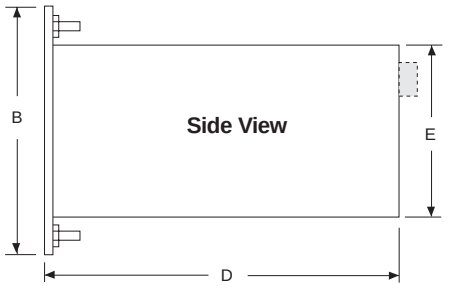
Display Technology:
Vacuum Fluorescent
Lines: (PCI 185)2 or 4
(PCI 185E)2
Characters per line:
(PCI 185)20 or 40
(PCI 185E)20
Character Height:
2 Lines x 20 Characters =
0.199" (5.05 mm)
2 Lines x 40 Characters =
0.183" (4.65 mm)
4 Lines x 20 Characters =
0.197" (5.0 mm)
Viewing Distance: . . . . . 10 ft.(3.05m)

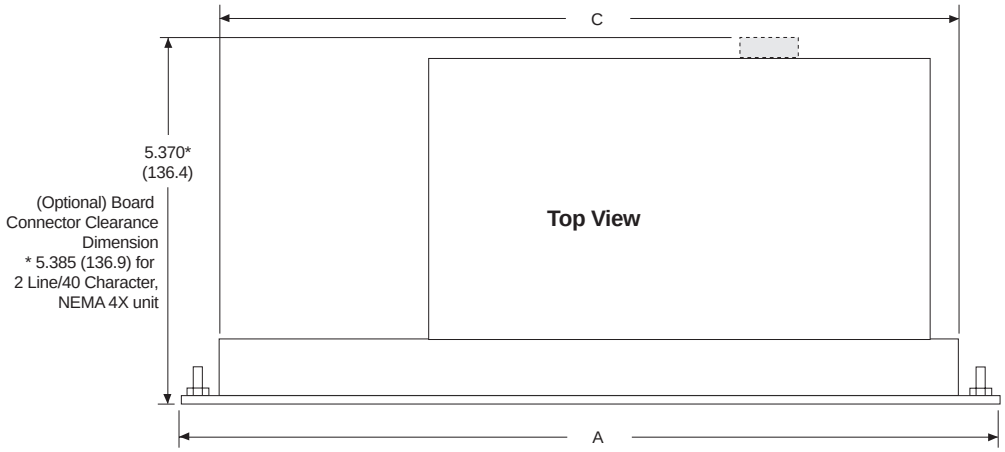
ELECTRICAL

Message Memory: . . . . . 8-128 Kbytes
Slave Port: . . . . . Optional
RS-232 Computer Port:
PMD or ASCII Protocol
Parallel Port Inputs: . . . . . .20 (optional)
Parallel Port Source Inputs: 10-30 VDC
Printer Port: . . . . . Optional
Power Source:
115 VAC (102-132), 47-63 Hz, 11 VA
230 VAC (194-250), 47-63 Hz, 11 VA
Electrical Interference:
NEMA ICS 2-230 Showering Arc Test
Electrical Tolerance:
ANSI C37.90a-1974 (SWC)
Surge Withstand Capability Test

ENVIRONMENTAL

Temperature (Ambient):
• Operational: 32 to 140 °F (0 to 60 °C)
• Storage: -40 to +203 °F (-40 to +95 °C)
Humidity:
10 to 95% RH, Noncondensing
Enclosure Rating: . . . . . NEMA 12





PCI 185	NEMA	A	B	C	D	E
2 Line/20 Character 8 F. Keys/Numeric Pad	**12**	11.484 (291.7)	5.370 (136.4)	10.984 (279.0)	5.175 (131.5)	4.370 (111.0)
2 Line/20 Character 8 F. Keys	**12**	9.550 (242.6)	4.420 (112.3)	9.050 (229.9)	5.175 (131.5)	3.420 (86.9)
4 Line/20 Character 16 F. Keys/Numeric Pad	**4X**	11.838 (300.7)	5.169 (156.7)	10.838 (275.3)	5.175 (131.5)	4.669 (118.6)
4 Line/40 Character 16 F. Keys/Numeric Pad	**12**	11.338 (288.0)	5.669 (144.0)	10.838 (275.3)	5.175 (131.5)	4.669 (118.6)
2 Line/20 Character 16 F. Keys/Numeric Pad	**4X**	11.984 (304.4)	5.870 (149.1)	10.984 (279.0)	5.175 (131.5)	4.370 (111.0)
2 Line/20 Character 16 F. Keys/Numeric Pad	**12**	11.484 (291.7)	5.370 (136.4)	10.984 (279.0)	5.175 (131.5)	4.370 (111.0)
2 Line/40 Character* 16 F. Keys/Numeric Pad	**4X**	13.875 (352.4)	5.870 (149.1)	12.875 (327.0)	5.190 (131.8)	4.370 (111.0)
2 Line/40 Character 16 F. Keys/Numeric Pad	**12**	13.375 (339.7)	5.370 (136.4)	12.875 (327.0)	5.175 (131.5)	4.370 (111.0)

PCI 185/185E Master Message Display (cont.)

How to Order

Part Number

185x - xxx x x xxxx x
1 2 3 4 5 6

Description

2- or 4-line Master Message Display

1:	**Model:**	Substitute for **xxx** from the following:
	185-22A	Display with two lines x 20 characters 0.199" (5.05 mm) high
	185-24A	Display with two lines x 40 characters 0.183" (4.65 mm) high
	185-42A	Display with four lines x 20 characters 0.197" (5 mm) high
	185E-22E	Display with two lines x 20 characters 0.199" (5.05 mm) high
2:	**Voltage:**	
	1	115/230 VAC Power Supply (PCI 185-22A/-24A/-42A only)
	2	24 VDC Isolated Power Supply
3:	**Bezel:**	
	N	NEMA 12 with Mounting Studs
	S	NEMA 4X Stainless Steel
	F	NEMA 12 Blank Front
4:	**Memory:**	
	008E	8K EEPROM
	032E	32K EEPROM
	064E	64K EEPROM
	128E	128K EEPROM
	032R	32K RAM
	128R	128K RAM
5:	**Options:**	
	0	None
	1	Slave, Printer, and Parallel Port (not available on PCI 185E-22E)
	2	RS-485 Interface without Slave/Printer/Parallel Port
6:	**Keypad(s):**	
	The following is for **185-22A** ONLY	
	Blank	16 Function Keys, 16 LEDs, Numeric Keypad
	C	8 Function Keys, Numeric Keypad
	G	8 Function Keys
	The following is for **185E-22E** ONLY	
	Blank	16 Function Keys, 16 LEDs, Numeric Keypad
	A	16 Function Keys, no LEDs, Numeric Keypad

Example:

185-22A 1 N 032R 0 G

Note: The Above part number specifies a PMD 185 display with two lines x 20 characters x 0.199" (5.05 mm) high, 115/230 VAC power supply, NEMA 12 bezel with mounting screws, 32K EEPROM memory, no options, and 8 Function Keys.

Miscellaneous

28107 Fuse 0.5 A (for 24 VDC operation)

28110 Fuse 0.25 A (for 115/230 VAC operation)

28421 Battery 3.6 V (1/2 AA Lithium)

43932 25- to 9-pin programming cable (RS-232C)

43962 9- to 9-pin programming cable (RS-232C)

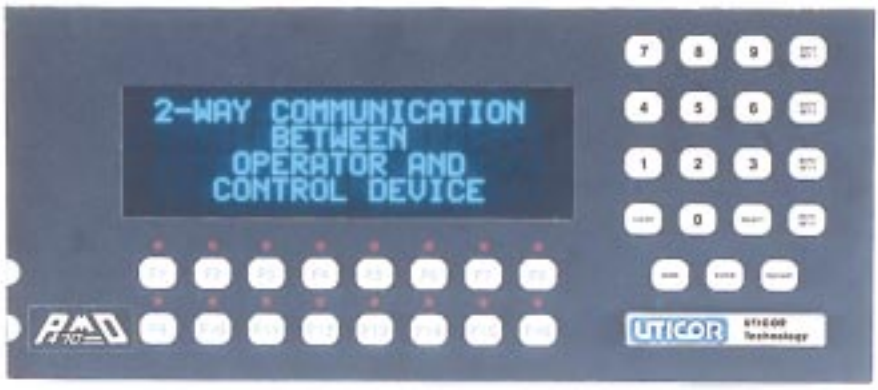
10F54 ***Free*** Programming Software

79736 User's Manual

Enclosures — Consult Factory for Availability

Note: All units come with a user's manual. Software must be ordered separately or downloaded from the AVG Uticor web site at: http://www.avg.net

PMD 470/475 Series Master Message Display for Modicon PLCs



Features:

- **Two-way communication between operator and machine**
- **4 x 20 char, with 0.358" (9.1 mm) character size visible from 18 ft. (5.5 m)**

Advanced Features:

- **Stores approximately 175 80-character messages per 16K of EEPROM memory**
- **Internal data logger has battery-backed RAM for storage of over 3,000 messages**
- **Scroll, chain, blink, print, log, & center messages**
- **16 User-Defined Function Keys (legends may be changed) and LED Indicators**
- **Numeric keypad for Data Entry**
- **Real-time Clock and Data Logger**
- **115/230 VAC (standard), 24 VDC (optional)**
- **UL Listed, CSA Approved FM Division I, Class 2, Groups A, B, C, D**
- **Front Panel: NEMA 12 (standard), NEMA 4X Stainless Steel (optional)**

AVG Uticor's PMD 470 and PMD 475 are versatile 4-line displays with 20 vacuum fluorescent characters 0.358" (9.1 mm) high per line.

PMD 470 directly connects to Modicon PLCs that support S908 remote I/O. PMD 470 emulates a D908 module so that it can exchange data with the PLC. The PMD 470 is programmed as a specific drop number.

PMD 475 directly connects to a Modicon Modbus Plus local area network system. The unit is a node on the network with its own network address, which allows it to exchange data with the PLC. The PMD 475 can be programmed to monitor PLC holding registers for message control, data set information, and LED control.

These products feature chaining, blinking, scrolling, printing, and centering messages. Hardware features include data logging, 115 chained-message queuing with prioritization capability, and the ability to program messages in U.S., English, Swedish, French, Danish, German, Cyrillic, and Japanese Kana international character sets.

Any ASCII terminal or personal computer with an RS-232C interface can be used to program a whole network of message displays. AVG Uticor's ***free*** custom software provides the menus, prompts and help screens that make message entry and editing easy... And, the message simulation feature lets you see your messages as they will appear on your AVG Uticor PMD 470/475.

Compatibility:

Slave Message Displays:
PMD 180S, PMD 200S, PMD 300S

Slave Marquee Dipslays:
PMD 1100, PMD 1200,
PMD 1205, PMD 1404,
PMD 1406, PMD 3000
PMD 3500

For your local AVG Automation Distributor or Technical Support inside the U.S. call: 1-800-TEC-ENGR.

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PMD 470/PMD 475 Master Message Display (cont.)

Specifications

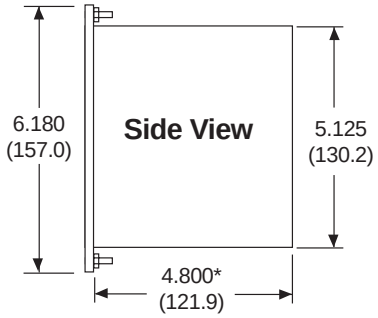
MECHANICAL
Weight: . . . . . 7.6 lb (3.45 kg)
Dimensions (inches):
See drawing—inches (mm)

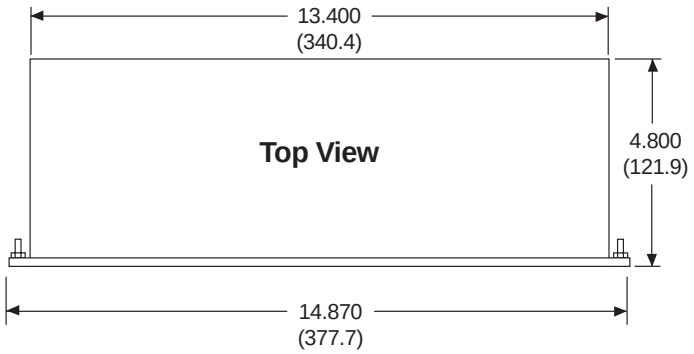
DISPLAY
Display Technology:
Vacuum Fluorescent
Lines: 4
Characters per line: 20
Character Height: . . . . 0.358" (9.1 mm)
Viewing Distance: . . . . . 18 ft. (5.5 m)

ELECTRICAL
Message Memory: . . . . . 16-128 Kbytes
Slave Port: RS-422A
Computer Port: RS-232C
Printer Port: . . . . . Parallel

Power Source:
• AC Model:
115 VAC (102-132), 47-63 Hz ,22 VA (jumper select)
230 VAC (194-250), 47-63 Hz , 22 VA (jumper select)
• DC Model:
24 VDC (21.6-26.4), 18 W
Electrical Interference:
NEMA ICS 2-230 Showering Arc Test
Electrical Tolerance:
ANSI C37.90a-1974 (SWC)
Surge Withstand Capability Test
Modicon PLC Connector:
(PMD 470) Female coaxial connector
Modbus Plus Connector:
(PMD 475) 9-pin female "D"-style connector

ENVIRONMENTAL
Temperature (Ambient):
• Operational:
32 to 140 °F (0 to 60 °C)
• Storage:
-40 to +203 °F (-40 to +95 °C)
Humidity:
10 to 95% RH, Noncondensing
Enclosure Rating:
NEMA 12 (standard)
NEMA 4X (stainless steel)





How to Order

Part Number

7673 x xx - xx
1 2 3

1:	**Model/Power Input:** Substitute for **x** from the following:	
	1	(PMD 470) 115/230 VAC
	2	(PMD 470) 24 VDC
	6	(PMD 475) 115/230 VAC
	7	(PMD 475) 24 VDC
2:	**Enclosure**	Substitute for **xx** from the following:
	Blank	NEMA 12
	SS	Stainless Steel NEMA 4X
3:	**Memory**	Substitute for **xx** from the following:
	16	16K total message memory
	32	32K total message memory
	64	64K total message memory
	128	128K total message memory

Example:

76731-16

The part number above describes a PMD 470 in a NEMA 12 enclosure, operating from 115/230 VAC, and having 16K memory.

Remote Operator Interfaces:

76801 **PMD 400E**
Remote Operator Interface:
32 function keys and 32 LEDs

76803 **PMD 400Es**
Remote Operator Interface:
16 function keys and 16 LEDs

58263 Remote Operator Station:
3 pushbuttons

Miscellaneous:

28105 Fuse 1.5 A (for 24 VDC oper.)
28106 Fuse 1.0 A (for 115 VAC oper.)
28107 Fuse 0.5 A (for 230 VAC oper.)
28421 Battery 3.6 V (1/2 AA Lithium)
10F32 Data Log Analyzer Software
10F50 ***Free*** Programming Software
79728 User's Manual
43686 Replacement Legend

Enclosures — Consult Factory for Availability

Note: All units come with a user's manual. Software must be ordered separately or downloaded from the AVG Uticor web site at: http://www.avg.net

PMD 180MC
Message Controller

Programmable Message Display for Modbus

Features:

- **Outputs message priority & queue of 16 messages to slave displays**
- **Outputs display time, date, variable data to slave displays**
- **Creates scroll, chain, blink, print, log, & center messages and outputs to slave displays**
- **Real-time Clock and Data Logger outputs to slave displays are standard**
- **UL Approved**
- **UL Listed, CSA Approved FM Division I, Class 2, Groups A, B, C, D**
- **115/230 VAC, 47-68 Hz, 8 VA (standard)**
- **24 VDC (20-32 VDC), 8 VA (optional)**

AVG Uticor's PMD 180MC Message Controller is intended to drive AVG Uticor's slave displays. It can output signals to drive 2- or 4-line displays with 40 or 80 characters. Parameters are set up with front panel pushbuttons. The unit features direct connection to Modicon Modbus-based PLCs. This product features outputs to enable chained, blinking, scrolling, printed, and centered messages on slave displays. Hardware features include data logging, 16-message queuing with prioritization capability, and the ability to program messages for output in U.S., English, Swedish, French, Danish, German, Cyrillic, and Japanese Kana international character sets.

Any ASCII terminal or personal computer with an RS-422 interface can be used to program a whole network of message displays. AVG Uticor's ***free*** custom software provides the menus, prompts and help screens that make message entry and editing easy... And, the message simulation feature lets you see your messages as they will appear on your AVG Uticor PMD slave displays.

Compatibility:

Slave Message Displays:
PMD 180S, PMD 200S, PMD 300S

Slave Marquee Dipslays:
PMD 1100, PMD 1200,
PMD 1205, PMD 1404,
PMD 1406, PMD 3000,
PMD 3500

For your local AVG Automation Distributor or Technical Support inside the U.S. call: 1-800-TEC-ENGR.

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PMD 180MC Message Controller (cont.)

Specifications

ELECTRICAL

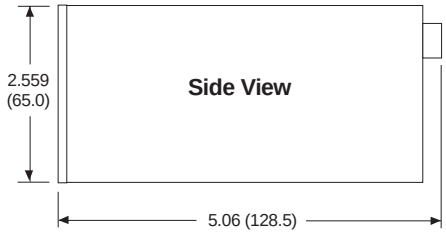
Message Memory: . . . . . 8-128 Kbytes
Slave Port: . . . . . Standard
Computer Port:
PMD or ASCII Protocol
RS232C/422A
Parallel Port Inputs: . . . . . 20 (optional)
Parallel Port Source Inputs: 10-30 VDC
Printer Port: . . . . . Optional
Power Source:
• AC model (standard)
115 VAC (102-132), 47-63 Hz, 8 VA
230 VAC (194-250), 47-63 Hz, 8 VA
• DC model (optional)
24 VDC (20-32 VDC), 8 VA
Electrical Interference:
NEMA ICS 2-230 Showering Arc Test
Electrical Tolerance:
ANSI C37.90a-1974 (SWC)
Surge Withstand Capability Test

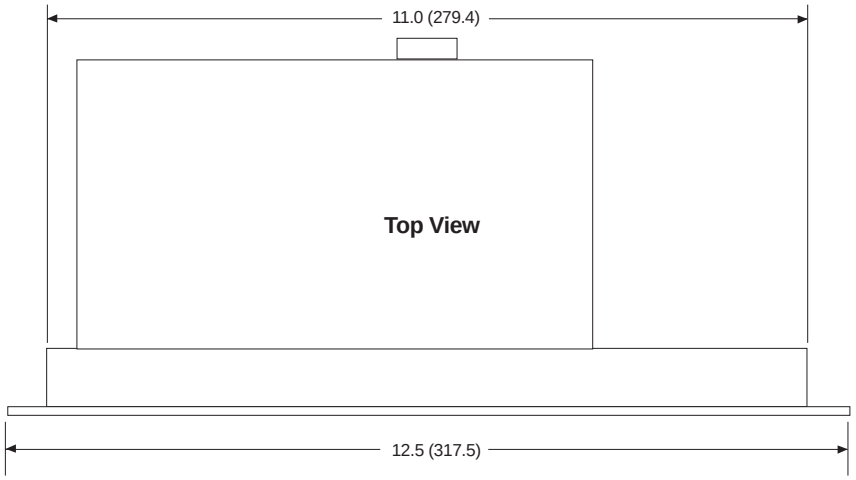
ENVIRONMENTAL

Temperature (Ambient):
• Operational:
32 to 140 °F (0 to 60 °C)
• Storage:
-40 to +203 °F (-40 to +95 °C)
Humidity:
10 to 95% RH, Noncondensing

MECHANICAL

Weight: . . . . . 3.8 lb. (1.72 kg)
Dimensions:
See drawing—inches (mm)





How to Order

Part Number		Description
180MC xx - xxxx		Message Controller
1 2		
1:	**Voltage:**	Substitute for **xx** from the following:
	1P	115/230 VAC Power Supply
	2P	24 VDC Isolated Power Supply
2:	**Memory:**	Substitute for **xxxx** from the following:
	008E	8K EEPROM
	032E	32K EEPROM
	064E	64K EEPROM
	128E	128K EEPROM
	032R	32K RAM
	128R	128K RAM

Example:

180MC-1P 032R

Note: The Above part number specifies a PMD180MC Message Controller for 115/230 VAC operation with 32K of EEPROM memory.

Miscellaneous:

28107 Fuse 0.5 A (for 230 VAC oper.)
28110 Fuse 0.25 A (for 115/230 VAC oper.)
28421 Battery 3.6 V (1/2 AA Lithium)
43932 25 to 9 pin programming cable for PMD 180 (RS-232C)
43962 9 to 9 pin programming cable
10F54 ***Free*** Programming Software
79736 User's Manual

Enclosures — Consult Factory for Availability

Note: All units come with a user's manual. Software must be ordered separately or downloaded from the AVG Uticor web site at: http://www.avg.net

PMD 370MC/375MC Message Controller

Programmable Message Display for Modicon PLCs

Features:

- **Stores approximately 175 80-character messages per 16K of EEPROM memory**
- **Internal data logger has battery-backed RAM for internal storage of over 3,000 messages**
- **Outputs scroll, chain, blink, print, log, & center formatted messages**
- **Real-time Clock and Data Logger**
- **UL Listed**
- **CSA Approved**
- **FM Division I, Class 2, Groups A, B, C, D**
- **115/230 VAC, 47-68 Hz, 11 VA (standard)**
- **24 VDC (20-32 VDC), 11 VA (optional)**

The PMD 370MC/375MC Message Controllers are essentially PMD 370/375 Master Message Displays without the built-in vacuum Flourescent display. They have all the features except that a slave display is required to view the messages.

PMD 370MC is functionally the same as the PMD 370 except that it lacks a built-in display. The unit directly connects to Modicon PLCs that support S908 remote I/O. PMD 370MC emulates a D908 module so that it can exchange data with the PLC. The PMD is programmed as a specific drop number.

PMD 375MC is functionally the same as the PMD 375 except that it lacks a built-in display. The unit directly connects to Modicon Modbus Plus local area network system. PMD 375 is a node on the network with its own network address, which allows it to exchange data with the PLC. The PMD can be programmed to monitor PLC holding registers for message control, data set information, and LED control.

These products generate chaining, blinking, scrolling, printing, and centering messages. Hardware features include data logging, 115 chained-message queuing with prioritization capability, and the ability to program messages in U.S., English, Swedish, French, Danish, German, Cyrillic, and Japanese Kana international character sets for output to slave display units.

Any ASCII terminal or personal computer with an RS-422A interface can be used to program a whole network of message displays. AVG Uticor's free custom software provides the menus, prompts and help screens that make message entry and editing easy...And, the message simulation feature lets you see your messages as they will appear on your AVG Uticor PMD Series slave displays.

Compatibility:

Slave Message Displays:
PMD 180S, PMD 200S, PMD 300S

Slave Marquee Dipslays:
PMD 1100, PMD 1200, PMD 1205, PMD 1404, PMD 1406, PMD 3000, PMD 3500

For your local AVG Automation Distributor or Technical Support inside the U.S. call: 1-800-TEC-ENGR.

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PMD 370MC/PMD 375MC Message Controller (cont.)

Specifications

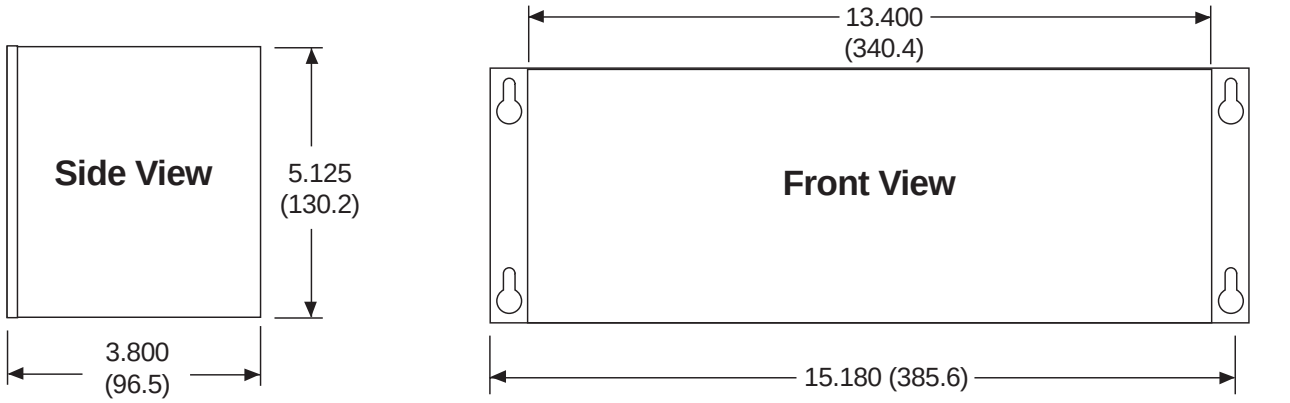
MECHANICAL
Weight: . . . . . 4.75 lb. (2.15 kg)
Dimensions:
See drawing—inches (mm)

ELECTRICAL
Message Memory: . . . . . 8-128 Kbytes
Slave Port: RS-422A
Computer Port: RS-422A/RS-232
Printer Port: . . . . . Parallel

Power Source:
• AC Model:
115 VAC (102-132), 47-63 Hz, 12 VA (jumper select)
230 VAC (194-250), 47-63 Hz, 12 VA (jumper select)
• DC Model:
24 VDC (21.6-26.4), 10 VA
Electrical Interference:
NEMA ICS 2-230 Showering Arc Test
Electrical Tolerance:
ANSI C37.90a-1974 (SWC)
Surge Withstand Capability Test

ENVIRONMENTAL
Temperature (Ambient):
• Operational:
32 to 140 °F (0 to 60 °C)
• Storage:
-40 to +203 °F (-40 to +95 °C)
Humidity:
10 to 95% RH, Noncondensing

Modicon PLC Connector
(PMD 370MC)
Female coaxial connector
Modbus Plus Connector
(PMD 375MC)
9-Pin Female "D"-style connector



How to Order

Part Number	Description
766MC xx - xx	Message Controller
1 2	

1: **Model/Power Input:** Substitute for **xx** from the following:

57	(PMD 370) 115/230 VAC
58	(PMD 370) 24 VDC
61	(PMD 375) 115/230 VAC
62	(PMD 375) 24 VDC

2: **Memory:** Substitute for **xx** from the following:

16	16K total message memory
32	32K total message memory
64	64K total message memory
128	128K total message memory

Example:

76657-16

The part number above describes a PMD 370MC operating from 115/230 VAC, and having 16K memory.

Remote Operator Interfaces:

76801 **PMD 400E**
Remote Operator Interface:
32 function keys and 32 LEDs

76803 **PMD 400Es**
Remote Operator Interface:
16 function keys and 16 LEDs

58263 Remote Operator Station:
3 pushbuttons

Miscellaneous:

28105 Fuse 1.5 A (for 24 VDC oper.)
28106 Fuse 1.0 A (for 115 VAC oper.)
28107 Fuse 0.5 A (for 230 VAC oper.)
28421 Battery 3.6 V (1/2 AA Lithium)
43932 25 to 9 pin programming cable
10F50 Programming Software
10F54 ***Free*** Programming Software
79710 User's Manual

Enclosures — Consult Factory for Availability

Note: All units come with a user's manual. Software must be ordered separately or downloaded from the AVG Uticor web site at: http://www.avg.net

PMD 180S
Slave Message Display

Features:

- **2- or 4-line display with 20 or 40 characters 0.183" (4.65 mm)**
- **Can be viewed from 10 ft (3.05 m)**
- **Accommodates Display time, date, variable data signals**
- **Will display scroll, chain, blink, print, log, & center messages**
- **UL Listed**
- **CSA Approved**
- **FM Division I, Class 2, Groups A, B, C, D**
- **115/230 VAC, 47-68 Hz, 11 VA (standard)**
- **24 VDC (20-32 VDC), 11 VA (optional)**
- **NEMA 12 Front panel built-in mounting studs (standard)**
- **NEMA 4X Stainless Steel front panel (optional)**

Compatibility:

PMD 180, PMD 180MC
PCI 185, PCI 185E
PMD 370, PMD 370MC
PMD 375, PMD 375MC
PMD 470, PMD 475
PMD 3170, PMD 3175
PMD 3670, PMD 3675
PowerPanel

For your local AVG Automation Distributor or Technical Support inside the U.S. call: 1-800-TEC-ENGR.

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AVG Uticor's PMD 180S Slave Display was designed to give you more display continuity and flexibility than ever before. This extraordinary low-cost unit is an alphanumeric display that can be interfaced to all of AVG Uticor's PMD Master Displays, AVG Uticor's Message Controllers, or any PC that has an RS-422A or RS-232C serial port.

Like its master counterpart, the PMD 180S is available with 2- or 4-line display with 40 or 80 vacuum fluorescent characters 0.183" (4.65 mm) high. Interfacing to this unit is not a problem either. The PMD 180S Slave Display supports both ASCII and AVG Uticor PMD protocols.

Each slave is given an individual address using the front panel pushbuttons. The units' addresses consist of a group number from 0 to 15 and a unit number from 0 to 4,095. Along with the individual addresses, you can also address all the displays in the same group or all the slave displays at once.

Connections to the PMD 180S Slave Display are made easily using the wire-clamp terminals provided on the back panel of the unit. To prevent tampering after setup, there is also a switch on the back panel that allows the disabling of the front panel pushbuttons.

PMD 180S Slave Message Display (cont.)

Specifications

ELECTRICAL

Interface Port: . . . . RS-232C & RS-422A

Power Source:
115 VAC (102-132), 47-63 Hz, 11 VA
230 VAC (194-250), 47-63 Hz, 11 VA

Electrical Interference:
NEMA ICS 2-230 Showering Arc Test

Electrical Tolerance:
ANSI C37.90a-1974 (SWC)
Surge Withstand Capability Test

ENVIRONMENTAL

Temperature (Ambient):

Operational:
32 to 140 °F (0 to 60 °C)

Storage:
-40 to +203 °F (-40 to +95 °C)

Humidity:
10 to 95% RH, Noncondensing

Enclosure Rating: . . . . . NEMA 12

DISPLAY

Display Technology:
Vacuum Fluorescent

Lines: . . . . . 2 or 4

Characters per line: . . . . . 20 or 40

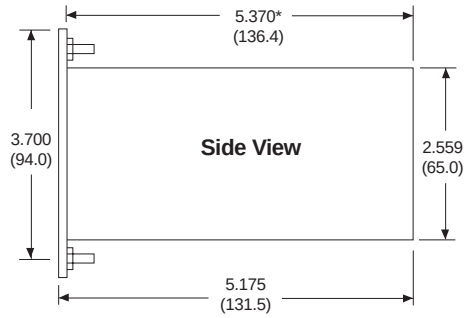
Character Height: . . . 0.183" (4.65 mm)

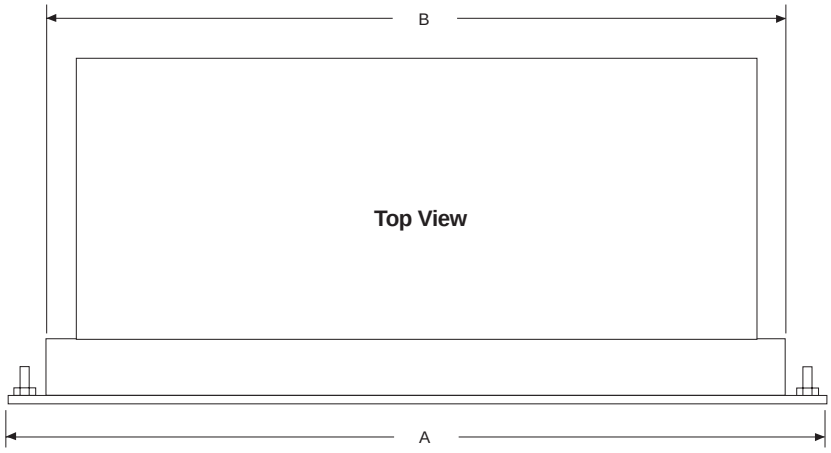
Viewing Distance: . . . . . 10 ft. (3.05 m)

MECHANICAL

Weight: . . . . . 3.5 lb. (1.59 kg)

Dimensions:
See drawing—inches(mm)





PMD 180S	NEMA	A	B
2 Line/20 Character	**12**	8.650 (219.7)	8.150 (207.1)
2 Line/40 Character	**12**	11.550 (293.4)	3.700 (94.0)
4 Line/20 Character	**12**	8.650 (219.7)	8.150 (207.1)

How to Order

Part Number		Description
180S xxx x x 1 2 3		2- or 4-line Master Message Display
1:	**Model:**	Substitute for **xxx** from the following:
	22A	Display with two lines x 20 characters 0.183" (4.65 mm) high
	24A	Display with two lines x 40 characters 0.183" (4.65 mm) high
	42A	Display with four lines x 20 characters 0.183" (4.65 mm) high
2:	**Voltage:**	Substitute for **x** from the following:
	1	115/230 VAC Power Supply
	2	24 VDC Isolated Power Supply
3:	**Bezel:**	Substitute for **x** from the following:
	N	NEMA 12 with Mounting Studs
	S	NEMA 4X Stainless Steel
	F	NEMA 12 Blank Front

Example:

180S-24A1N

Note: The Above part number specifies a PMD180S slave display with two lines x 40 characters x 0.183" (4.65 mm) high with 115/230 VAC power supply, and NEMA 12 bezel with mounting screws.

Miscellaneous:

28107 Fuse 0.5 A (for 24 VDC oper.)

28110 Fuse 0.25 A (for 115/230 VAC oper.)

79741 User's Manual

Enclosures — Consult Factory for Availability

Note: All units come with a user's manual.

PMD 200S
Slave Message Display

Features:

- **2-line display with 20 vacuum fluorescent characters 0.433" (11.0 mm) high**
- **Can be viewed from 20 ft. (6.1 m)**
- **Accommodates Display time, date, variable data signals**
- **Will display scroll, chain, blink, print, log, & center messages**
- **UL Listed**
- **CSA Approved**
- **FM Division I, Class 2, Groups A, B, C, D**
- **115/230 VAC, 47-68 Hz, 18 VA (standard)**
- **24 VDC (20-32 VDC), 18 VA (optional)**
- **NEMA 12 Front panel (standard)**
- **NEMA 4X Stainless Steel front panel (optional)**

Compatibility:

PMD 180, PMD 180MC
PCI 185, PCI 185E
PMD 370, PMD 370MC
PMD 375, PMD 375MC
PMD 470, PMD 475
PMD 3170, PMD 3175
PMD 3670, PMD 3675
PowerPanel

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AVG Uticor's PMD 200 Slave Display was designed to give you more display continuity and flexibility than ever before. This extraordinary low-cost unit is an alphanumeric display that can be interfaced to all of AVG Uticor's PMD Master Message Displays, Message Controllers, Master Marquee Display, Touchscreen Programmable Graphical Interface, or any PC that has an RS-422A or RS-232C serial port.

Like its PMD 200 Series Master Display counterpart, the PMD 200 Slave is available with 2-line display with 20 vacuum fluorescent characters 0.433" (11.0 mm) high. Interfacing to this unit is not a problem either. The PMD 200 Slave Display supports both ASCII and AVG Uticor PMD protocols.

Each slave is given an individual address using switch one and two on the back of the panel . The units' addresses consist of a group number from 0 to 15 and a unit number from 0 to 4,095. Along with the individual addresses, you can also address all the displays in the same group or all the slave displays at once.

Connections to the PMD 200 Slave Display are made easily using the wire-clamp terminals provided on the back panel of the unit.

PMD 200S Slave Message Display (cont.)

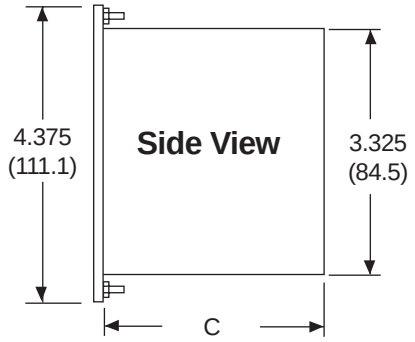
Specifications

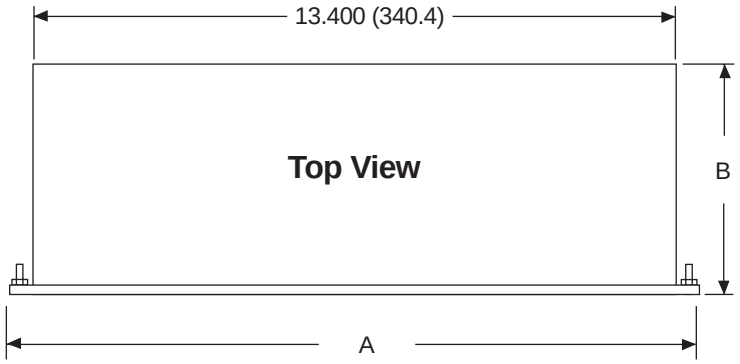
MECHANICAL
Weight: . . . . . 5.6 lb. (2.54 kg)
Dimensions:
See drawing— inches (mm)

DISPLAY
Display Technology:
Vacuum Fluorescent
Lines: 2
Characters per line: 20
Character Height:
0.433" (11.0 mm)
Viewing Distance:
20 ft. (6.1 m)

ELECTRICAL
Interface Port: RS-232/422A
Power Source:
115 VAC (102-132), 47-63 Hz, 18 VA
230 VAC (194-250), 47-63 Hz, 18 VA
Electrical Interference:
NEMA ICS 2-230 Showering Arc Test
Electrical Tolerance:
ANSI C37.90a-1974 (SWC)
Surge Withstand Capability Test

ENVIRONMENTAL
Temperature (Ambient):
Operational:
32 to 140 °F (0 to 60 °C)
Storage:
-32 to +203 °F (-40 to +95 °C)
Humidity:
10 to 95% RH, Noncondensing
Enclosure Rating:
NEMA 12 (standard),
NEMA 4X (optional)





PMD 200S	NEMA	A	B	C
Standard Model	**12**	14.370 (365.0)	4.375 (111.1)	4.800 (121.9)
Stainless Steel Model	**4X**	14.870 (377.7)	4.875 (123.8)	4.814 (122.3)

How to Order

Part Number — Description

765 xx xx — 2-line Slave Message Display
1 2

1: Power Input: Substitute for **xx** from the following:

38	115/230 VAC Power Supply
44	24 VDC Isolated Power Supply

2: Enclosure: Substitute for **xx** from the following:

Blank	NEMA 12
SS	NEMA 4X Stainless Steel

Example:

76538

Note: The Above part number specifies a PMD200S Slave display with 115/230 VAC power supply, and NEMA 12 bezel.

Miscellaneous:

28105 Fuse 1.5 A (for 24 VDC operation)
28106 Fuse 1.0 A (for 115 VAC operation)
28107 Fuse 0.5 A (for 230 VAC operation)
58281 DIN Mounting Kit
79722 User's Manual
Enclosures — Consult Factory for Availability

Note: All units come with a user's manual.

PMD 300S
Slave Message Display
Programmable Message Display

Features:

- **4 lines x 20 character display**
- **Large 0.5" (12.5 mm) character size, visible from 25' (7.62 m)**
- **Can be driven by any AVG Uticor PMD Master Display, Master Marquee Display, Message Controller, or Touchscreen Programmable Graphical Interface**
- **UL Listed**
- **CSA Approved**
- **FM Division I, Class 2, Groups A, B, C, D**
- **115/230 VAC, 47-68 Hz, 22 VA (standard)**
- **24 VDC (20-32 VDC), 18 VA (optional)**
- **NEMA 12 Front panel built-in mounting studs (standard)**
- **NEMA 4X Stainless Steel front panel (optional)**

AVG Uticor's PMD 300S Slave comes with a versatile 4-line display with 20 vacuum fluorescent characters 0.5" (12.5 mm) high per line. It is exactly the same as the PMD 370 and PMD 375 Master Message Displays except that it doesn't store messages. It does, however, display information from any AVG Uticor Master Message Display, Master Marquee Display, Message Controller, Touchscreen Programmable Graphical Interface, computer, or other serial communication device.

This product features chaining, blinking, scrolling, printing, and centering messages. Hardware features include the ability to display messages in U.S., English, Swedish, French, Danish, German, and Cyrillic international character sets.

Compatibility:

PMD 180, PMD 180MC
PCI 185, PCI 185E
PMD 370, PMD 370MC
PMD 375, PMD 375MC
PMD 470, PMD 475
PMD 3170, PMD 3175
PMD 3670, PMD 3675
PowerPanel

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PMD 300S Slave Message Display (cont.)

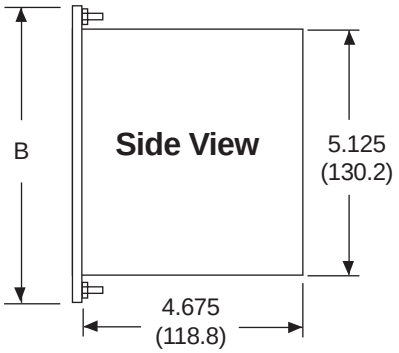
Specifications

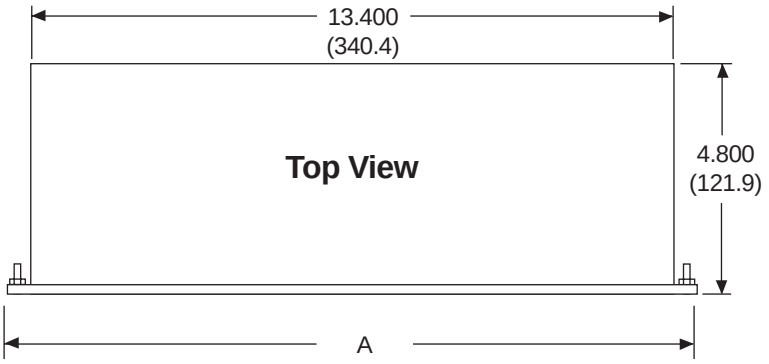
MECHANICAL
Weight: . . . . . 7.6 lb (3.45 kg)
Dimensions:
See drawing— inches (mm)

DISPLAY
Display Technology:
Vacuum Fluorescent
Lines: 4
Characters per line: 20
Character Height:
0.5" (12.5 mm)
Viewing Distance:
25 ft. (7.62 m)

ELECTRICAL
Slave Port: RS-422A
Power Source:
• AC Model:
115 VAC (102-132), 47-63 Hz, 22 VA (jumper select)
230 VAC (194-250), 47-63 Hz, 22 VA (jumper select)
• DC Model:
24 VDC (21.6-26.4), 18 VA
Electrical Interference:
NEMA ICS 2-230 Showering Arc Test
Electrical Tolerance:
ANSI C37.90a-1974 (SWC)
Surge Withstand Capability Test

ENVIRONMENTAL
Temperature (Ambient):
• Operational:
32 to 140 °F (0 to 60 °C)
• Storage:
-40 to +203 °F (-40 to +95 °C)
Humidity:
10 to 95% RH, Noncondensing
Enclosure Rating:
NEMA 12 (standard)
NEMA 4X (stainless steel)





PMD 200S	NEMA	A	B
Standard Model	**12**	14.370 (365.0)	6.180 (157.0)
Stainless Steel Model	**4X**	14.870 (377.7)	6.680 (169.7)

How to Order

Part Number	Description
765 xx xx 1 2	4-line Slave Message Display

1:	Power Input:	Substitute for **xx** from the following:
	47	115/230 VAC Power Supply
	50	24 VDC Isolated Power Supply

2:	Enclosure:	Substitute for **xx** from the following:
	Blank	NEMA 12
	SS	NEMA 4X Stainless Steel

Example:

76547

Note: The Above part number specifies a PMD300S Slave in aNEMA 12 enclosure, operating from a 115/230 VAC..

Miscellaneous:

28105 Fuse 1.5 A (for 24 VDC operation)
28106 Fuse 1.0 A (for 115 VAC operation)
28107 Fuse 0.5 A (for 230 VAC operation)
79722 User's Manual
Enclosures — Consult Factory for Availability

Note: All units come with a user's manual.

Programmable Marquee Display

Introduction:

AVG Uticor Marquees can be found in numerous applications throughout all industries. In 1996, a *CONTROL ENGINEERING* Magazine study named the AVG Uticor brand of Marquees as the most specified and recognized Marquee product line in industry.

Marquees are intended for use where messages need to be conveyed over large visual distances up to 400 ft. (121.9 m). Hence, they have larger display areas and character heights than are found in AVG Uticor's Programmable Message Display product line. These extremely versatile products, enable your Modicon PLC or control system using Modbus Plus, or Modbus Remote I/O to display vital production status or alarm messages to plant-floor personnel in real time.

AVG Uticor offers three lines of Marquees:

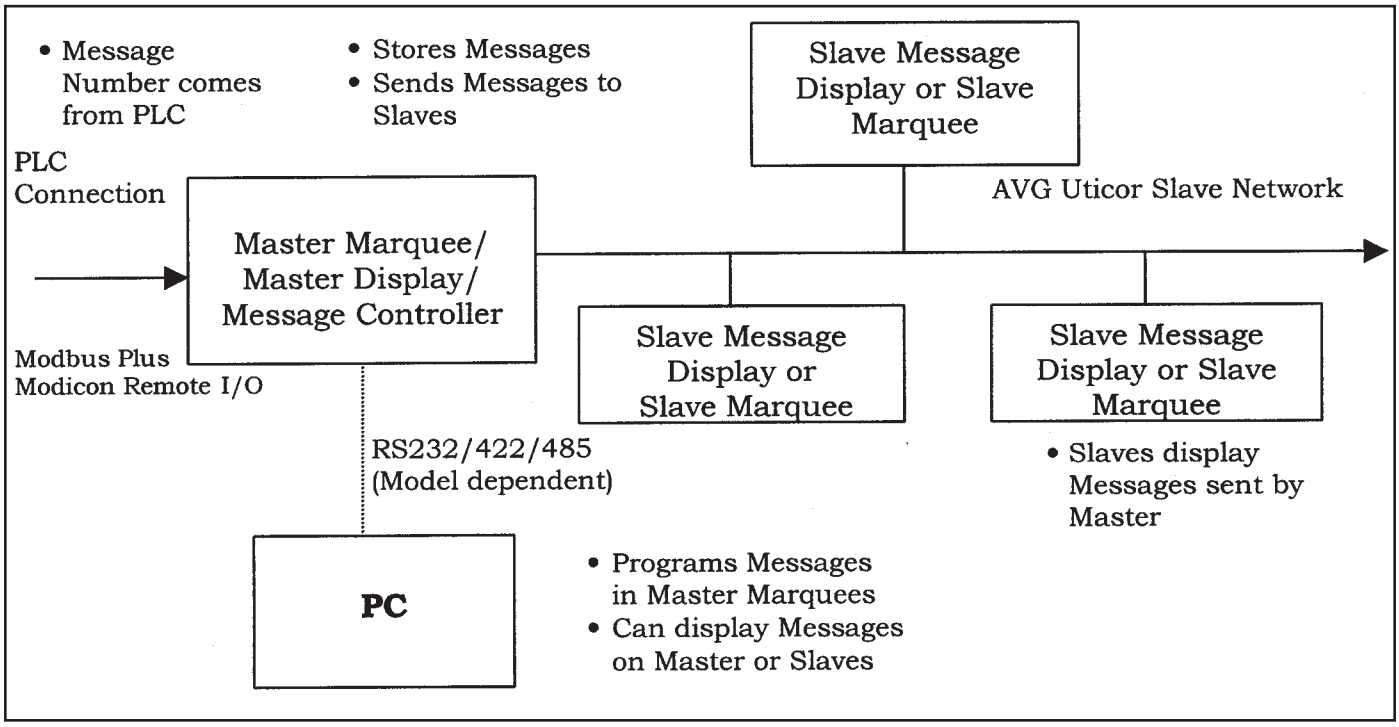
- **LED-based Master Marquees**
- **LED-based Slave Marquees**
- **LED-based Numerical Marquees:**

A **Master Marquee** is alphanumeric and stores up to 175, 80-character messages per 16K of memory. These messages and their characteristics (such as blinking, centering, scrolling, etc.) are programmed using a programming software (runs on a PC) available ***free*** from AVG Uticor. A Master Marquee continuously polls the connected PLC for a message number and several control parameters (may or may not be programmable in some cases). Based on the control parameters, the Master Marquee can display the message, send the message to one or a group of Slave displays (described below), or it can broadcast the message over Uticor Slave Network. A PC can also control the Master Marquee. Master Marquees come in two configurations, Red LED (PMD 3170 and PMD 3175) and Tricolor LED (PMD 3670 and PMD 3675).

Slave Marquees do not store messages. They are typically used with a Master Marquee, Master Message Display, Message Controller or a Touchscreen Programmable Graphical Interface. A Master Marquee, Master Message Display, Message Controller, or Touchscreen Program-mable Graphical Interface can drive a network of several Slaves. Each Slave used on a network has a unique address. Addressing scheme allows a message to be sent to one, several, or all Slaves on the network. Slave Marquees include PMD 1100, PMD 1200, and PMD 1205.

The **LED-based Numerical Marquee** comes in 4- (PMD 1404) or 6-digit (PMD 1406) versions. With 7-segmented LEDs, these displays only show numerical values. Any PMD 1404 or 1406 can be used as a Master to drive additional PMD 1404 or 1406 units as Slaves.

Marquee Networking Block Diagram


• Message Number comes from PLC
• Stores Messages
• Sends Messages to Slaves
Slave Message Display or Slave Marquee
PLC Connection
AVG Uticor Slave Network
Master Marquee/ Master Display/ Message Controller
Modbus Plus Modicon Remote I/O
Slave Message Display or Slave Marquee
Slave Message Display or Slave Marquee
RS232/422/485 (Model dependent)
• Slaves display Messages sent by Master
PC
• Programs Messages in Master Marquees
• Can display Messages on Master or Slaves

Selecting the right model

The PMD Master Marquee receives Message inputs from a Modbus Plus, or Modicon Remote I/O source and outputs Messages to one or more Slave units installed at strategic locations throughout the user's plant. A PC can be connected for programming purposes.

AVG offers a variety of Marquee models to meet different application needs. A user will select a Marquee based on following criteria:

- **Visibility Distance (size of characters)**
- **Number of lines on display**
- **Characters per line**
- **PLC Connectivity**

Below is a table to help you select right model for your application based on the above criteria. In addition to above characteristics, Marquees offers a wide variety of features. A list of features is given later in this section. Please refer to data sheets of each model for more information on a model.

MARQUEE COMPARISON TABLE										
MODEL	PLC CONNECTION			DISPLAY						PAGE
	MODICON S908 REMOTE I/O	MODBUS	MODBUS PLUS	CHARACTER SIZE (mm)	ALPHANUMERIC	LINES	CHARACTERS PER LINE	COLOR (R=RED, G=GREEN, Y=YELLOW)	DISTANCE (ft.)	
NUMERIC MARQUEES										
PMD 1404	—	—	—	4"	N	1	4	R	200	84-85
PMD 1406	—	—	—	4"	N	1	6	R	200	84-85
ALPHANUMERIC MASTER MARQUEES										
PMD 3170	X			2"-8"	A	1-8 *	5-80 *	R	100-400	72-73
PMD 3175			X	2"-8"	A	1-8 *	5-80 *	R	100-400	72-73
PMD 3670	X			2"-8"	A	1-8 *	5-80 *	R,G,Y	100-400	74-75
PMD 3675			X	2"-8"	A	1-8 *	5-80 *	R,G,Y	100-400	74-75
ALPHANUMERIC SLAVE MARQUEES										
PMD 1100	--	--	--	2"	A	1-8	20	R	100	76-77
PMD 1200	--	--	--	4"	A	1-8	20	R	200	78-79
PMD 1205	--	--	--	4"	A	1-8	10	R	200	78-79
PMD 3000	--	--	--	2"-8"	A	1-8 *	5-80 *	R	100-400	84-85
PMD 3500	--	--	--	2"-8"	A	1-8 *	5-80 *	R,G,Y	100-400	84-85

* Note: See tables on pages 81 or 83 for details

Marquee Display Features

AVG Uticor's Human-Machine Interfaces offer many features that enhance your ability to display pertinent information. Here's a brief listing of some of the more common features and what they are (*Every model may not support all of the following features*):

Blinking

A character, word, or message flashes on and off at a user/programmable rate; used to attract attention to a message of high priority.

Chained Message

Links up to 115 individual messages together and displays at a user-defined rate.

Circular Message Queue

A list of messages displayed in the order that they are triggered according to their message display time. The list wraps around from the last message back to the first message and continues to cycle through the queue until the user makes a change.

Data Log

An area of memory set aside for a time- and date-stamped historical record of events in the unit.

Invisible Messages

Messages sent to a printer or Slave Marquee, but not to the Master Marquee's own display.

Off-line Programming

Message programs are developed with AVG Uticor software and stored to disk. The message file can then be uploaded to the Master Marquee unit. The computer does not need to be connected to the unit for this programming process.

On-line Programming

Master Marquee unit is programmed directly from the computer. The unit must be connected to the programming computer. With on-line programming, the user can develop screens while the display unit is running. This allows modification of the screens without having to take the unit off line.

Real-Time Clock

A clock that indicates the passage of actual time.

Scrolling Message

A message that moves from the bottom of the display to the top, or from the right of the display to the left.

PMD 3170/3175
Master Marquee Display
For Modicon PLCs

Features:

- **1 to 8 Lines (see table, pg. 61)**
- **5 to 80 Red LED Characters per Line. (see table, pg. 61)**
- **2" (50.8 mm) to 8" (203.2mm)High Characters**
- **Eight International Character Sets**
- **16K to 128K Memory**
- **4 Variable Data Sets**
- **NEMA 12 or NEMA 4 enclosure**
- **Free Message Programming Software**
- **Data Logging**

Compatiblilty:

PMD 180S, PMD 200S, PMD 300S
PMD 1100, PMD 1200, PMD 1205
PMD 1404, PMD 1406
PMD 3000, PMD 3500

The PMD 3170 and PMD 3175 use attention-getting RED LED colors to indicate equipment status instantly. These versatile displays also let you adjust character and line heights, add blinking, scrolling, and unveiling effects, and feature multiple messages simultaneously.

PMD 3170 directly connects to Modicon PLCs that support S908 remote I/O. PMD 3170 emulates a D908 module so that it can exchange data with the PLC. The Marquee is programmed as a specific drop number.

PMD 3175 directly connects to Modicon Modbus Plus local area network system. The unit is a node on the network with its own network address, which allows it to exchange data with the PLC. The PMD 3175 can be programmed to monitor PLC holding registers for message control and data set information.

Hanging Kits:

Part Numbers— Standard Construction	Stainless Steel	Display Type
58257	58401	Single Display, 1W2H/2W2H
58258	58402	Single Display, 1W4H/2W4H
58259	58403	Single Display, 1W8H/2W8H
58268	58407	Single Display, 4W2H/4W4H
58260	58404	Back-to-back, 1W2H/2W2H
58261	58405	Back to-back, 1W4H/2W4H
58262	58406	Back-to-back, 1W8H/2W8H
58270	58408	Back-to-back, 4W2H/4W4H

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PMD 3170/3175 Master Marquee Display (cont.)

Specifications

DISPLAY
Number of Lines: see table
Characters per Line: see table
Size of Characters:
2", 4", 6", 8", and narrow 8" (50.8, 101.6, 152.4, and 203.2 mm)
Viewing Distance:
100, 200, 300, and 400 ft. (30.5, 61.0, 91.4, and 121.9 m)
Character Sets:
Eight, including: U.S., Cyrillic, Danish, German, English, French, Swedish, and Japanese Kana

ENVIRONMENTAL
Temperature (ambient):
• Operating:
32 to 140 °F (0 to 60 °C)
• Storage:
-40 to +203 °F (-40 to +95 °C)
Humidity:
10 to 95% RH
Noncondensing

ELECTRICAL
Power Source:
• AC Units:
115 VAC (102-132) 47-63 Hz
230 VAC (194-250) 47-63 Hz
1W2H—75 VA
1W4H / 2W2H—135 VA
1W8H / 2W4H / 4W2H—255 VA
2W8H / 4W4H—495 VA
Interference:
NEMA ICS 2-230
Showering Arc Test
Tolerance:
ANSI C37.90a-1974 (SWC)
Surge Withstand
Capability Test

Master Marquee Display Options

PMD 3170 / 3175		CHARACTERS					VIEWING AREA	
MODEL	DISPLAY	2"	4"	6"	8"	8" N	HEIGHT	WIDTH
1W2H	LINES	2	1	—	—	—	5.3" (134.5 mm)	36.5" (927.1 mm)
	CHARACTERS PER LINE	20	10	—	—	—		
1W4H	LINES	4	2	1	1	1	10.1" (256.5 mm)	36.5" (927.1 mm)
	CHARACTERS PER LINE	20	10	6	5	10		
1W8H	LINES	8	4	2	2	2	19.7" (500.4 mm)	36.5" (927.1 mm)
	CHARACTERS PER LINE	20	10	6	5	10		
2W2H	LINES	2	1	—	—	—	5.3" (134.5 mm)	72.5" (927.1 mm)
	CHARACTERS PER LINE	40	20	—	—	—		
2W4H	LINES	4	2	1	1	1	10.1" (256.5 mm)	72.5" (927.1 mm)
	CHARACTERS PER LINE	40	20	13	10	20		
2W8H	LINES	8	4	2	2	2	19.7" (500.4 mm)	72.5" (927.1 mm)
	CHARACTERS PER LINE	40	20	13	10	20		
4W2H	LINES	2	1	—	—	—	5.3" (134.5 mm)	144.5" (3670.3 mm)
	CHARACTERS PER LINE	80	40	—	—	—		
4W4H	LINES	4	2	1	1	1	10.1" (256.5 mm)	144.5" (3670.3 mm)
	CHARACTERS PER LINE	80	40	26	20	40		

How to Order

Part Number		Description
317x-x xxx S xxxx x 1 2 3 4 5		Red LED Alphanumeric Master Marquee
1:	**Model:**	Substitute for **x** from the following:
	0	Modicon Remote I/O
	5	Modbus Plus
2:	**Housing:**	Substitute for **x** from the following:
	N	NEMA 12
	S	NEMA 4X Stainless Steel
	F	NEMA 4
3:	**Memory:**	Substitute for **xxx** from the following:
	016	16K EEPROM
	032	32K EEPROM
	064	64K EEPROM
	128	128K EEPROM
4:	**Size:**	Substitute for **xxxx** from the following:
	1W2H	Cabinet: 11.5" x 40" x 4" (292.1 x 1016 x 101.6mm)
	1W4H	Cabinet: 16.3" x 40" x 4" (414 x 1016 x 101.6mm)
	1W8H	Cabinet: 25.9" x 40" x 4" (657.9 x 1016 x 101.6mm)
	2W2H	Cabinet: 11.5" x 76" x 4" (292.1 x 1930 x 101.6mm)
	2W4H	Cabinet: 16.3" x 76" x 4" (414 x 1930 x 101.6mm)
	2W8H	Cabinet: 25.9" x 76" x 4" (657.9 x 1930 x 101.6mm)
	4W2H	Cabinet: 11.5" x 150" x 4" (292.1 x 3810 x 101.6mm)
	4W4H	Cabinet: 16.3" x 150" x 4" (414 x 3810 x 101.6mm)
5:	**LED Type:**	Substitute for **x** from the following:
	Blank	Normal Brightness
	B	High Brightness

Example:

3170-F 032 S 2W4H B

NOTE: The above part number specifies a 3170 Master Marquee Display in a NEMA 4 housing, having 32K EEPROM memory, single-sided, 16.3" x 76" x 4",(414 x 1930 x 101.6 mm) and with high brightness LEDs.

Miscellaneous:

58263 Remote Operator Station (3 Pushbuttons, Mode, Enter, and Restart)

43424-xx RS-232C cable from Remote Station to PMD 3170/3175) Replace xx in part number with length designator:
07 23 ft. (7 m)
15 9 ft. (15 m)
23 75 ft. (75 m)
30 98 ft. (39 m)

27632 Fuse, 5.0 A, Slo-Blo, (2W8H/4W4H)

27633 Fuse, 1.5 A, Slo-Blo(1W2H/1W4H/2W2H)

27637 Fuse, 3.0 A, Slo-Blo(1W8H/2W4H/4W2H)

79726 User's Manual

10F32 Data Log Analyzer Software

10F50 ***Free*** Program Development Software

NOTE: All units come with a user's manual. Software must be ordered separately or downloaded from our web site: http://www.avg.net.

PMD 3670/3675
Master Marquee Display

Tricolor Marquee For Modicon PLCs

Features:

- **1 to 4 Lines (see table, pg. 63)**
- **5 to 40 Tricolor (Red, Yellow, Green) LED Characters per Line (see table, pg. 63)**
- **2" (50.8 mm) to 8" (203.2 mm) High Characters**
- **Eight International Character Sets**
- **16K to 128K Memory**
- **4 Variable Data Sets**
- **NEMA 12 or NEMA 4 enclosure**
- **Free Message Programming Software**
- **Data Logging**

Compatibility:

PMD 180S, PMD 200S, PMD 300S
PMD 1100, PMD 1200, PMD 1205
PMD 1404, PMD 1406
PMD 3000, PMD 3500

PMD 3670 and PMD 3675 use attention-getting Red, Yellow, and Green LED colors to indicate equipment status instantly. These versatile displays also let you adjust character and line heights, add blinking, scrolling, and unveiling effects, and feature multiple messages simultaneously.

PMD 3670 directly connects to Modicon PLCs that support S908 remote I/O. PMD 3670 emulates a D908 module so that it can exchange data with the PLC. The Marquee is programmed as a specific drop number.

PMD 3675 directly connects to Modicon Modbus Plus local area network system. The unit is a node on the network with its own network address, which allows it to exchange data with the PLC. The PMD can be programmed to monitor PLC holding registers for message control, data set information.

Hanging Kits:

Part Numbers— Standard Construction	Stainless Steel	Display Type
58257	58401	Single Display, 1W2H/2W2H
58258	58402	Single Display, 1W4H/2W4H
58260	58404	Back-to-back, 1W2H/2W2H
58261	58405	Back to-back, 1W4H/2W4H

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PMD 3670/3675 Master Marquee Display (cont.)

Specifications

DISPLAY
Number of Lines: . . . . . 1-4 (see table)
Characters per Line: . . . 5-40 (see table)
Size of Characters:
2", 4", 6", and 8"
(50.8, 101.6, 152.4, and 203.2 mm)
Viewing Distance:
100, 200, 300, and 400 ft.
(30.5, 61.0, 91.4, and 121.9 m)
Character Sets:
Eight, including: U.S., Cyrillic, Danish, German, English, French, Swedish, and Japanese Kana

ENVIRONMENTAL
Temperature: (Ambient)
• Operating:
32 to 140 °F (0 to 60 °C)
• Storage:
-40 to +203 °F (-40 to 95 °C)
Humidity:
10 to 95% RH Noncondensing

ELECTRICAL
Power Source:
• AC Units:
115 VAC (102-132), 47-63 Hz
230 VAC (194-250), 47-63 Hz
1W2H—75 VA
1W4H / 2W2H—135 VA
2W4H—255 VA

Interference:
NEMA ICS 2-230 Showering Arc Test
Tolerance:
ANSI C37.90a-1974 (SWC)
Surge Withstand Capability Test

Marquee Display Options

PMD 3670/3675		CHARACTERS					VIEWING AREA	
MODEL	DISPLAY	2"	4"	6"	8"	8" N	HEIGHT	WIDTH
1W2H	LINES	2	1	—	—	—	5.3" (134.6 mm)	36.5" (927.1 mm)
	CHARACTERS PER LINE	20	10	—	—	—		
1W4H	LINES	4	2	1	1	1	10.1" (256.5 mm)	36.5" (927.1 mm)
	CHARACTERS PER LINE	20	10	6	5	10		
2W2H	LINES	2	1	—	—	—	5.3" (134.6 mm)	72.5" (1841.5 mm)
	CHARACTERS PER LINE	40	20	—	—	—		
2W4H	LINES	4	2	1	1	1	10.1" (256.5 mm)	72.5" (1841.5 mm)
	CHARACTERS PER LINE	40	20	13	10	20		

How to Order

Part Number

367x-x xxx S xxxx x
1 2 3 4 5

Description

Tricolor LED Alphanumeric Master Marquee

1:	**Model:**	Substitute for **x** from the following:
	0	Modicon Remote I/O
	5	Modbus Plus
2:	**Housing:**	Substitute for **x** from the following:
	N	NEMA 12
	S	NEMA 4X Stainless Steel
	F	NEMA 4
3:	**Memory:**	Substitute for **xxx** from the following:
	016	16K EEPROM
	032	32K EEPROM
	064	64K EEPROM
	128	128K EEPROM
4:	**Size:**	Substitute for **xxxx** from the following:
	1W2H	Cabinet: 11.5" x 40" x 4" (292.1 x 1016 x 101.6mm)
	1W4H	Cabinet: 16.3" x 40" x 4" (414 x 1016 x 101.6mm)
	2W2H	Cabinet: 11.5" x 76" x 4" (292.1 x 1930 x 101.6mm)
	2W4H	Cabinet: 16.3" x 76" x 4" (414 x 1930 x 101.6mm)
5:	**Tricolor (Red, Yellow, Green) LED Type:**	Substitute for **x** from the following:
	Blank	Normal Brightness
	B	High Brightness

Example:

3670-F 032 S 2W4H B

NOTE: The above part number specifies a 3670 Master Marquee Display in a NEMA 4 housing, having 32K EEPROM memory, single-sided, 16.3" x 76" x 4",(414 x 1930 x 101.6 mm) and with high brightness LEDs.

Miscellaneous:

58263 Remote Operator Station (3 Pushbuttons, Mode, Enter, and Restart)

43424-xx RS-232C cable from Remote Station to PMD 3670/3675) Replace xx in part number with length designator:

07	23 ft. (7 m)
15	9 ft. (15 m)
23	75 ft. (75 m)
30	98 ft. (39 m)

27633 Fuse, 1.5 A, Slo-Blo (1W2H/1W4H/2W2H)

27637 Fuse, 3.0 A, Slo-Blo (2W4H)

79726 User's Manual

10F32 Data Log Analyzer Software

10F50 ***Free*** Program Development Software

NOTE: All units come with a user's manual. Software must be ordered separately or downloaded from our web site: http://www.avg.net.

PMD 1100
Slave Marquee Display

(1100-2 shown)

Features:

- **1 to 8 Lines**
- **20 Characters per Line**
- **2" (50.8 mm)High Red LED Characters**
- **Eight International Character Sets**
- **4 Variable Data Sets of 5 digits each**
- **NEMA 12 enclosure**
- **Free Message Programming Software**

Compatibility:

PMD 180, PMD 370/375
PCI 185, PCI 185E, PMD 470/475
PMD 180MC, PMD 370/375 MC
PMD 3170/3175, PMD 3670/3675
PowerPanel

The PMD 1100 is a slim-line alphanumeric slave marquee display that uses attention-getting RED LED colors to indicate equipment status instantly. This versatile display can be stacked up to eight units high and wall-mounted or suspended above production aisles.

These slave units display information received from an AVG Uticor Master Message Display, Master Marquee Display, Message Controller, Touchscreen Programmable Graphical Interface, computer, or other intelligent device with serial communication capabilities.

Messages can be stationary, blinking, centered, or smoothly scrolling from right to left. The PMD 1100 can also display a bar graph.

For your local AVG Automation Distributor or Technical Support inside the U.S. call: 1-800-TEC-ENGR.

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PMD 1100 Slave Marquee Display (cont.)

Specifications

DISPLAY
Number of Lines: 1
Characters per Line: 20
Size of Characters: . . . . . 2" (50.8 mm)
Viewing Distance: . . . . . 100 ft. (30.5 m)
Character Sets:
Eight, including: U.S., Cryllic, Danish, German, English, French, Swedish, and Japanese Kana

ENVIRONMENTAL
Temperature (Ambient):
• Operating:
32 to 140 °F (0 to 60 °C)
• Storage:
-40 to +203 °F (-40 to +95 °C)
Humidity:
10 to 95% RH Noncondensing

ELECTRICAL
Power Source:
AC Units:
115 VAC (102-132), 47-63 Hz, 45 VA
230 VAC (194-250), 47-63 Hz, 45 VA
Interference:
NEMA ICS 2-230 Showering Arc Test
Tolerance:
ANSI C37.90a-1974 (SWC)
Surge Withstand Capability Test

How to Order

Part Number	Description
1100 - x	Red LED Alphanumeric Slave Marquee
1	

1: Model: Substitute for **x** from the following:

All enclosures are 38.36" W. and 4.00" D. (974.3mm W. and 101.6mm D.)

1	1 line, 20 Characters per line, Enclosure: 4.25" high (108 mm)
2	2 lines, 20 Characters per line, Enclosure: 8.52" high (216.4 mm)
3	3 lines, 20 Characters per line, Enclosure: 12.79" high (324.9 mm)
4	4 lines, 20 Characters per line, Enclosure: 17.06" high (433.3 mm)
5	5 lines, 20 Characters per line, Enclosure: 21.33" high (541.8 mm)
6	6 lines, 20 Characters per line, Enclosure: 25.60" high (650.2 mm)
7	7 lines, 20 Characters per line, Enclosure: 29.87" high (758.7 mm)
8	8 lines, 20 Characters per line, Enclosure: 34.14" high (867.2 mm)

Example:

1100 - 2

NOTE: The above part number specifies two 1100 Slave Marquee Displays in NEMA 12 housings, stacked two high and joined with a single side panel.

Wall-Mounted End Plates:

Part Number	1100 Series Model
58378	1100-1
58379	1100-2
58380	1100-3
58381	1100-4
58382	1100-5
58383	1100-6
58384	1100-7
58385	1100-8

Miscellaneous:

28104	Fuse, 0.75 A, 115 VAC operation
28108	Fuse, 0.375 A, 230 VAC operation
58366	Back-to-back hanging kit for two individual 1100-1s
79730	User's Manual
10F40	ASCII Sender (if not using w/Master)

Note: All units come with a user's manual.

PMD 1200/1205
Slave Marquee Display

Features:

- **1 to 8 Lines**
- **10 or 20 Characters per Line**
- **4" (101.6 mm) High Red LED Characters**
- **Eight International Character Sets**
- **4 Variable Data Sets of 5 digits each**
- **NEMA 12 enclosure**
- **Suspend or Wall-Mount**
- **Stack two or more display units**

Compatibility:

PMD 180, PMD 370/375
PCI 185, PCI 185E, PMD 470/475
PMD 180MC, PMD 370/375MC
PMD 3170/3175, PMD 3670/3675
PowerPanel

The PMD 1200/1205 is a slim-line alphanumeric slave marquee display that uses attention-getting RED LED colors to indicate equipment status instantly. This versatile display can be stacked up to eight units high and wall-mounted or suspended above production aisles.

These slave units display information received from an AVG Uticor Master Message Display, Master Marquee Display, Message Controller, Touchscreen Programmable Graphical Interface, computer, or other intelligent device with serial communication capabilities.

Messages can be stationary, blinking, centered, or smoothly scrolling from right to left. The PMD 1200 (only) can also display a bar graph.

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PMD 1200/1205 Slave Marquee Display (cont.)

Specifications

DISPLAY

Number of Lines: . . . . . one
Characters per Line: . . . (PMD 1200) 20
. . . . . (PMD 1205) 10
Size of Characters: . . . . . 4" (101.6 mm)
Viewing Distance: . . . . . 200 ft. (61.0 m)
Character Sets:
Eight, including: U.S., Cryllic, Danish, German, English, French, Swedish, and Japanese Kana

ENVIRONMENTAL

Temperature (Ambient):
• Operating:
32 to 140 °F (0 to 60 °C)
• Storage:
-40 to +203 °F (-40 to +95 °C)
Humidity:
10 to 95% RH
Noncondensing

ELECTRICAL

Power Source
AC Units:
115 VAC (102-132), 47-63 Hz, 45 VA
230 VAC (194-250), 47-63 Hz, 45 VA
Interference:
NEMA ICS 2-230
Showering Arc Test
Tolerance:
ANSI C37.90a-1974 (SWC)
Surge Withstand Capability Test

How to Order

Part Number		Description
7120 x - x		Slim-line Alphanumeric Slave Marquee
1 2		
1:	**Model:**	Substitute for **x** from the following:
	0	Twenty 4" (101.6 mm) characters per line All units 74.18" (1884.2 mm) W. and 4.00" (101.6 mm) D.
	5	Ten 4" (101.6 mm) characters per line All units 38.45"(976.6 mm) W. and 4.00" (101.6 mm) D.
2:	**Lines:**	Substitute for **x** from the following:
	1	1 line, 6.50" high (165.1 mm)
	2	2 lines, 13.02" high (330.7 mm)
	3	3 lines, 19.54" high (496.3 mm)
	4	4 lines, 26.06" high (738.1 mm)
	5	5 lines, 32.58" high (827.5 mm)
	6	6 lines, 39.10" high (993.1 mm)
	7	7 lines, 45.62" high (1158.8 mm)
	8	8 lines, 52.14" high (1324.4 mm)

Example:

1200 - 2

NOTE: The above part number specifies two 1200 Slave Marquee Displays in NEMA 12 housings, stacked two high and joined with a single side panel.

Wall-Mounted End Plates:

Part Number	1200/1205 Series Model
58376	1200-1/1205-1
58377	1200-2/1205-2
58388	1200-3/1205-3
58389	1200-4/1205-4
58390	1200-5/1205-5
58391	1200-6/1205-6
58392	1200-7/1205-7
58393	1200-8/1205-8

Miscellaneous:

28104 Fuse, 0.75 A, 115 VAC operation
28108 Fuse, 0.375 A, 230 VAC operation
58366 Back-to-back hanging kit for two individual 1200/1205-1s
79730 User's Manual
10F40 ***Free*** PMD Sender Software

Note: All units come with a user's manual. Software must be ordered separately or downloaded from our web site; http://www.avg.net

PMD 3000
Slave Marquee Display
Red LED Marquee

Features:

- **1 to 8 Lines (see table, pg. 61)**
- **5 to 80 Red LED Characters per Line. (see table, pg. 61)**
- **2" (50.8 mm) to 8" (203.2mm)High Characters**
- **Eight International Character Sets**
- **4 Variable Data Sets**
- **NEMA 12 or NEMA 4 enclosure**

The PMD 3000 uses attention-getting RED LED colors to indicate equipment status instantly. This versatile display also lets you adjust character and line heights, add blinking, scrolling, and unveiling effects, and feature multiple messages simultaneously.

High-brightness Red LEDs are available as an option.

Compatiblilty:

PMD 180, PMD 370/375
PCI 185/185E, PMD 470/475
PMD 180MC, PMD 370/375MC
PMD 3170/3175, PMD 3670/3675
PowerPanel

Hanging Kits:

Part Numbers— Standard Construction	Stainless Steel	Display Type
58257	58401	Single Display, 1W2H/2W2H
58258	58402	Single Display, 1W4H/2W4H
58259	58403	Single Display, 1W8H/2W8H
58268	58407	Single Display, 4W2H/4W4H
58260	58404	Back-to-back, 1W2H/2W2H
58261	58405	Back to-back, 1W4H/2W4H
58262	58406	Back-to-back, 1W8H/2W8H
58270	58408	Back-to-back, 4W2H/4W4H

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PMD 3000 Slave Marquee Display (cont.)

Specifications

DISPLAY
Number of Lines: see table
Characters per Line: see table
Size of Characters:
2", 4", 6", 8", and narrow 8" (50.8, 101.6, 152.4, and 203.2 mm)
Viewing Distance:
100, 200, 300, and 400 ft. (30.5, 61.0, 91.4, and 121.9 m)
Character Sets:
Eight, including: U.S., Cyrillic, Danish, German, English, French, Swedish, and Japanese Kana

ENVIRONMENTAL
Temperature (ambient):
• Operating:
32 to 140 °F (0 to 60 °C)
• Storage:
-40 to +203 °F (-40 to +95 °C)
Humidity:
10 to 95% RH
Noncondensing

ELECTRICAL
Power Source:
• AC Units:
115 VAC (102-132) 47-63 Hz
230 VAC (194-250) 47-63 Hz
1W2H—75 VA
1W4H / 2W2H—135 VA
1W8H / 2W4H / 4W2H—255 VA
2W8H / 4W4H—495 VA
Interference:
NEMA ICS 2-230
Showering Arc Test
Tolerance:
ANSI C37.90a-1974 (SWC)
Surge Withstand
Capability Test

Master Marquee Display Options

PMD 3000		CHARACTERS					VIEWING AREA	
MODEL	DISPLAY	2"	4"	6"	8"	8" N	HEIGHT	WIDTH
1W2H	LINES	2	1	—	—	—	5.3" (134.5 mm)	36.5" (927.1 mm)
	CHARACTERS PER LINE	20	10	—	—	—		
1W4H	LINES	4	2	1	1	1	10.1" (256.5 mm)	36.5" (927.1 mm)
	CHARACTERS PER LINE	20	10	6	5	10		
1W8H	LINES	8	4	2	2	2	19.7" (500.4 mm)	36.5" (927.1 mm)
	CHARACTERS PER LINE	20	10	6	5	10		
2W2H	LINES	2	1	—	—	—	5.3" (134.5 mm)	72.5" (927.1 mm)
	CHARACTERS PER LINE	40	20	—	—	—		
2W4H	LINES	4	2	1	1	1	10.1" (256.5 mm)	72.5" (927.1 mm)
	CHARACTERS PER LINE	40	20	13	10	20		
2W8H	LINES	8	4	2	2	2	19.7" (500.4 mm)	72.5" (927.1 mm)
	CHARACTERS PER LINE	40	20	13	10	20		
4W2H	LINES	2	1	—	—	—	5.3" (134.5 mm)	144.5" (3670.3 mm)
	CHARACTERS PER LINE	80	40	—	—	—		
4W4H	LINES	4	2	1	1	1	10.1" (256.5 mm)	144.5" (3670.3 mm)
	CHARACTERS PER LINE	80	40	26	20	40		

How to Order

Part Number

3000-x xxxx x
1 2 3

Description

Red LED Alphanumeric Slave Marquee

1: Housing: Substitute for **x** from the following:

N	NEMA 12
S	Stainless Steel
F	NEMA 4

2: Size: Substitute for **xxxx** from the following:

1W2H	Cabinet: 11.5" x 40" x 4" (292.1 x 1016 x 101.6mm)
1W4H	Cabinet: 16.3" x 40" x 4" (414 x 1016 x 101.6mm)
1W8H	Cabinet: 25.9" x 40" x 4" (657.9 x 1016 x 101.6mm)
2W2H	Cabinet: 11.5" x 76" x 4" (292.1 x 1930 x 101.6mm)
2W4H	Cabinet: 16.3" x 76" x 4" (414 x 1930 x 101.6mm)
2W8H	Cabinet: 25.9" x 76" x 4" (657.9 x 1930 x 101.6mm)
4W2H	Cabinet: 11.5" x 150" x 4" (292.1 x 3810 x 101.6mm)
4W4H	Cabinet: 16.3" x 150" x 4" (414 x 3810 x 101.6mm)

3: LED Type: Substitute for **x** from the following:

Blank	Normal Brightness
B	High Brightness

Example:

3000-N 1W2H B

NOTE: The above part number specifies a 3000 Slave Marquee Display in a NEMA 4 housing, single-sided, 11.5" x 40" x 4", (292.1 x 1016 x 101.6 mm) and with high brightness LEDs.

Miscellaneous:

27632 Fuse, 5.0 A, Slo-Blo, (2W8H/4W4H)
27633 Fuse, 1.5 A, Slo-Blo(1W2H/1W4H/2W2H)
27637 Fuse, 3.0 A, Slo-Blo(1W8H/2W4H/4W2H)
79722 User's Manual

NOTE: All units come with a user's manual.

PMD 3500
Slave Marquee Display

Tricolor Marquee

Features:

- **1 to 4 Lines (see table, pg. 63)**
- **5 to 40 Tricolor (Red, Yellow, Green) LED Characters per Line (see table, pg. 63)**
- **2" (50.8 mm) to 8" (203.2 mm) High Characters**
- **Eight International Character Sets**
- **4 Variable Data Sets**
- **NEMA 12 or NEMA 4 enclosure**

PMD 3500 uses attention-getting Red, Yellow, and Green LED colors to indicate equipment status instantly. This versatile display also lets you adjust character and line heights, add blinking, scrolling, and unveiling effects, and feature multiple messages simultaneously.

Compatibility:

PMD 180, PMD 370/375
PMD 185/185E, PMD 470/475
PMD 180MC, PMD 370/375MC
PMD 3170/3175, PMD 3670/3675
PowerPanel

Hanging Kits:

Part Numbers— Standard Construction	Stainless Steel	Display Type
58257	58401	Single Display, 1W2H/2W2H
58258	58402	Single Display, 1W4H/2W4H
58260	58404	Back-to-back, 1W2H/2W2H
58261	58405	Back to-back, 1W4H/2W4H

For your local AVG Automation Distributor or Technical Support inside the U.S. call: 1-800-TEC-ENGR.

ModConnect®

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PMD 3500 Slave Marquee Display (cont.)

Specifications

DISPLAY
Number of Lines: . . . . . 1-4 (see table)
Characters per Line: . . . 5-40 (see table)
Size of Characters:
2", 4", 6", 8", and narrow 8"
(50.8, 101.6, 152.4, and 203.2 mm)
Viewing Distance:
100, 200, 300, and 400 ft.
(30.5, 61.0, 91.4, and 121.9 m)
Character Sets:
Eight, including: U.S., Cyrillic, Danish, German, English, French, Swedish, and Japanese Kana

ENVIRONMENTAL
Temperature: (Ambient)
• Operating:
32 to 140 °F (0 to 60 °C)
• Storage:
-40 to +203 °F (-40 to 95 °C)
Humidity:
10 to 95% RH Noncondensing

ELECTRICAL
Power Source:
• AC Units:
115 VAC (102-132), 47-63 Hz
230 VAC (194-250), 47-63 Hz
1W2H—75 VA
1W4H / 2W2H—135 VA
2W4H—255 VA
2W8H—495 VA

Interference:
NEMA ICS 2-230 Showering Arc Test
Tolerance:
ANSI C37.90a-1974 (SWC)
Surge Withstand Capability Test

Marquee Display Options

PMD 3500		CHARACTERS					VIEWING AREA	
MODEL	DISPLAY	2"	4"	6"	8"	8" N	HEIGHT	WIDTH
1W2H	LINES	2	1	—	—	—	5.3" (134.6 mm)	36.5" (927.1 mm)
	CHARACTERS PER LINE	20	10	—	—	—		
1W4H	LINES	4	2	1	1	1	10.1" (256.5 mm)	36.5" (927.1 mm)
	CHARACTERS PER LINE	20	10	6	5	10		
2W2H	LINES	2	1	—	—	—	5.3" (134.6 mm)	72.5" (1841.5 mm)
	CHARACTERS PER LINE	40	20	—	—	—		
2W4H	LINES	4	2	1	1	1	10.1" (256.5 mm)	72.5" (1841.5 mm)
	CHARACTERS PER LINE	40	20	13	10	20		
2W8H	LINES	8	4	2	2	2	19.7" (500.4 mm)	72.5" (927.1 mm)
	CHARACTERS PER LINE	40	20	13	10	20		

How to Order

Part Number

3500-x xxxx x
1 2 3

Description

Tricolor LED Alphanumeric Slave Marquee

1:	Housing:	Substitute for **x** from the following:
	N	NEMA 12
	F	NEMA 4

2:	Size:	Substitute for **xxxx** from the following:
	1W2H	Cabinet: 11.5" x 40" x 4" (292.1 x 1016 x 101.6mm)
	1W4H	Cabinet: 16.3" x 40" x 4" (414 x 1016 x 101.6mm)
	2W2H	Cabinet: 11.5" x 76" x 4" (292.1 x 1930 x 101.6mm)
	2W4H	Cabinet: 16.3" x 76" x 4" (414 x 1930 x 101.6mm)
	2W8H	Cabinet: 25.9" x 76" x 4" (657.9 x 1930 x 101.6mm)

Example:

3500-N 1W2H B

NOTE: The above part number specifies a 3500 Slave Marquee Display in a NEMA 12 housing, that is single-sided, 11.5" x 40" x 4", (292.1 x 1016 x 101.6 mm).

Miscellaneous:

27632 Fuse, 5.0 A, Slo-Blo, (2W8H/4W4H)
27633 Fuse, 1.5 A, Slo-Blo(1W2H/1W4H/2W2H)
27637 Fuse, 3.0 A, Slo-Blo(2W4H)
79722 User's Manual

NOTE: All units come with a user's manual.

PMD 1404/1406
Numeric Marquee Display

(1404)

(1406)

Features:

- **1 to 8 Lines**
- **4 or 6 Digits**
- **4" (101.6 mm) High Red LED Digits**
- **Seven-Segment Digit**
- **Selectable decimal point and colon**
- **NEMA 12 enclosure**

The PMD 1404/1406 are four- or six-digit numerical marquee displays that use attention-getting RED LED colors to indicate numerical equipment status instantly. These versatile displays can be stacked up to eight units high and wall-mounted or suspended above production aisles.

These units display numerical data received from an AVG Uticor Master Message Display, Master Marquee Display, Message Controller.

The PMD 1404/1406 also come with DIP-switch selectable decimal points and colons.

Touchscreen Programmable Graphical Interface, computer, or other intelligent device with serial communication capabilities. PMD 1404/1406 displays have a slave port allowing them to be networked, one PMD 1404/1406 acts as a master to additional PMD 1404/1406 units, acting as slaves.

PMD 1404 displays numbers between -999 to 9999.

PMD 1406 displays numbers between -99999 to 999999.

Compatibility:

PMD 180, PMD 370/375
PMD 185/185E, PMD 470/475
PMD 180MC, PMD 370/375MC
PMD 3170/3175, PMD 3670/3675
PowerPanel

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PMD 1404/1406 Numerical Marquee Display (cont.)

Specifications

DISPLAY
Number of Lines: . . . . . 1 to 8
Characters per Line:
(PMD 1404) 4 Seven-Segment
(PMD 1406) 6 Seven-Segment
Size of Characters: . . . . . 4" (101.6 mm)
Viewing Distance: . . . . . 200 ft.(61 m)

ENVIRONMENTAL
Temperature (ambient):
Operating:
32 to 140 °F (0 to 60 °C)
Storage:
40 to 203 °F (-40 to 95 °C)
Humidity:
10 to 95% RH Noncondensing

ELECTRICAL
Power Source:
115 VAC (102-132), 47-63 Hz
230 VAC (194-250), 47-63 Hz
Current Draw:
1404 (4-digit) 45 VA
1406 (6-digit) 50 VA
Interference:
NEMA ICS 2-230 Showering Arc Test
Tolerance:
ANSI C37.90a-1974 (SWC)
Surge Withstand Capability Test

How to Order

Part Number		Description
140 - x - x 1 2		Numeric Marquee Display
1:	**Model:**	Substitute for **x** from the following:
2:	**Lines:**	Substitute for **x** from the following:
		All units are 19.1" (485.1 mm) wide and 6.5" (165.1 mm) high
	1	1 line, 4.25" high (108 mm)
	2	2 lines, 8.52" high (216.4 mm)
	3	3 lines, 12.79" high (324.9 mm)
	4	4 lines, 17.06" high (433.3 mm)
	5	5 lines, 21.33" high (541.8 mm)
	6	6 lines, 25.60" high (650.2 mm)
	7	7 lines, 29.87" high (758.7 mm)
	8	8 lines, 34.14" high (867.2 mm)

Example:

1404 - 2

NOTE: The above part number specifies two 1404 Numerical Marquee Displays in NEMA 12 housings, stacked two high and joined with a single side panel.

Wall-Mounted End Plates:

Part Number	1404/1406 Series Model
58338	1404-1/1406-1
58339	1404-2/1406-2
58340	1404-3/1406-3
58341	1404-4/1406-4
58342	1404-5/1406-5
58343	1404-6/1406-6
58344	1404-7/1406-7
58345	1404-8/1406-8

Miscellaneous:

75G40 Counter/parallel input option board
75G56 Real-time clock option board
75G55 Printer port sub-option board (must have 75G40 or 75G56)
75G87 Analog current input board (4-20 mA and 10-50 mA)
75G92 Analog current input board (0-1 VDC and 0-10 VDC)
28106 Fuse, 1A, 250 V, Slo-Blo, Type 7 Mini
79737 User's Manual

Note: All units come with a user's manual.

Isolated Bidirectional Adapter

RS-232C ⟷ RS-422A/RS-485A

Features:

- **Isolated Bidirectional Data Transmission**
- **Compact Size**
- **Self-Contained Power Supply**
- **LED Indicators**
- **High Noise Immunity**
- **Jumper Selectable Operational Modes**
- **Panel-Mount or Desk Top**
- **RS-232 "D" Connector and Screw Terminals**
- **RS-422A/RS-485A Screw Terminals**
- **Optically Isolated**
- **300 to 120K baud**
- **Asynchronous Half-Duplex or Full Duplex**

With the Isolated Bidirectional Adapter, you are able to interface between devices using RS-232C and RS-422A/RS-485A communication protocols.

The two data ports are optically isolated from each other and serial asynchronous half-duplex or full-duplex transmission of data is achieved at baud rates of 300 to 120K.

RS-232C transmission distance is limited to 50 ft (15.2 m), while the RS-422A/RS-485A effective communication distance is rated to 4,000 ft (1.22 km).

The RS-422A/RS-485A port can interface to ten multidropped RS-485A receiver inputs without a repeater. The unit contains one, nonisolated RS-422A/RS-485A dedicated repeater receiver/driver.

The Isolated Bidirectional Adapter can be panel mounted, or used on a desk top with optional rubber feet. All electrical and data inputs are made to the front or top of the unit using D-type connectors and screw terminals. Operation modes are selected with jumper pins.

For your local AVG Automation Distributor or Technical Support inside the U.S. call: 1-800-TEC-ENGR.

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Isolated Bidirectional Adapter (cont.)

Specifications

Service Power:
115(102-132)/230 (194-250) VDC
at 47-63 Hz

Power Consumption: . . . . . .12 W

Fuse Rating:
1/4" A Slo-Blo,
1/4" x 1 1/4" AGC
(115/230 VAC)

ENVIRONMENTAL
Temperature:
- Operational: 32 to 130 °F (0 to 55 °C)
- Storage: -49 to +203 °F (-45 to +95 °C)

Humidity: 10-95% RH noncondensing

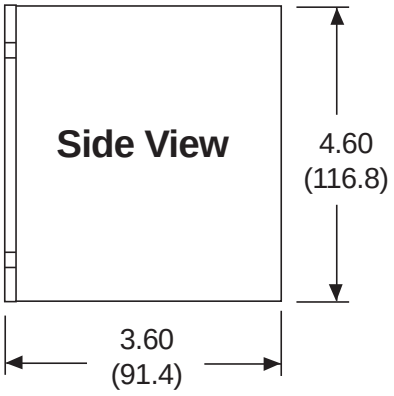
Power Consumption Dielectric:
The unit will withstand applications of 1,500 VAC RMS for one minute between any RS-422A/RS-485A port terminals and RS-232C port terminals.

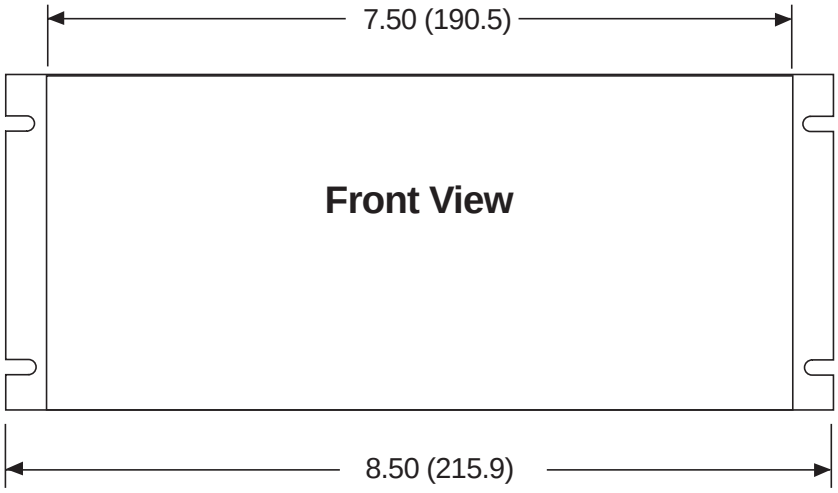
Interface Connections:RS-232C, RS-422A/RS-485A
RS-232C:Female "D-type"25-pin and screw terminals (use one)
RS-422A/RS-485A: . . . . Screw terminals

Housing: . . . . . .Brushed Aluminum

Dimensions: 8.5 (W) x 3.6 (D) x 4.6" (H) (215.9 x 91.4 x 116.8 mm)

Weight: 2.5 lb. (1.13 kg)





How to Order

76830	Isolated Bidirectional Adapter: RS-422A to RS-422A
76535	Isolated Bidirectional Adapter: RS-232C to RS-422A
28110	Fuse: 1/4" A Slo-Blo, 1/4" x 1/4" AGC

SIP 100 Serial Impact Printer

A versatile printer meeting all of your Uticor PMD and PowerPanel applications and more...

Features:

- **2.25" (57.2 mm) Wide Paper**
- **6 x 8 Dot Matrix Impact Print Head**
- **Replaceable Ribbon Cartridge**
- **24, 32, or 40 Characters per Line**
- **Prints 42 Lines per Minute**
- **Prints Double Height and Width**
- **RS-232C Interface to PMD and PowerPanel**
- **Operates on 120 VAC**
- **Table Top or Panel Mount**

The SIP 100 serial printer interfaces to any Uticor Programmable Message Display (PMD or PowerPanel) through the RS-232C printer port. Any Uticor product offering the printing of the data log can send those contents to the SIP 100.

In addition, the unit can be used as a tabletop or panel mounted printer.

The SIP 100 can be used for recording alarm messages with time and date stamps from the PMD. It can also be used to print messages stored in the PMD.

Specifications

TRANSFORMER
Power Supply:
Input-120 VAC, 60 Hz
Output-9 VAC, 1.5 A
Cable Length: . . . . . 6 ft. (1.83 m)

PRINTER
Power: . . . . . .1.5 W (idle), 10 W (active)
Operating Temperature:
41 to 104 °F (5 to 40 °C)

Dimensions:
4 x 4.5 x 2" (101.6 x 114.3 x 50.8 mm)
Weight: . . . . . 14 oz (0.4 kg)
Mounting: . . . . . .Table Top or Panel
Printer Type: . .Impact, 6 x 8 Dot Matrix

Speed:
42 Lines per Minute (24 Column)
Print Head Life: . . . . . 500,000 Lines

Character Spacing:

24 Column	12.8 Characters/in
32 Column	17 Characters/in
40 Column	21 Characters/in

Serial Interface: RS-232C
Ribbon Life:
Black-200,000 characters
Purple-250,000 characters
Paper:
2.25" (57.2 mm) wide standard adding machine paper

For your local AVG Automation Distributor or Technical Support inside the U.S. call: 1-800-TEC-ENGR.

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SIP 100 Serial Impact Printer

How to Order

Miscellaneous

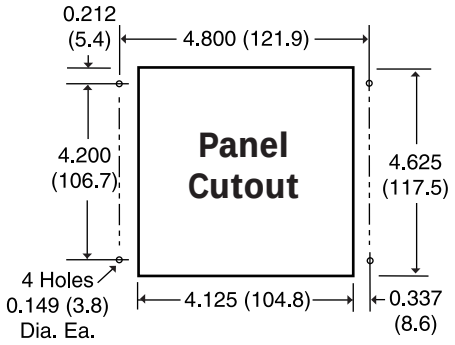
58371 Small paper roll for SIP 100 (10 rolls per package)

43496 Cable, PMD 370/375, 470/475, 370MC/375MC to SIP 100
13.12 ft (4 m), 25-pin connector

44238 Cable, PMD 180/180MC & PCI, 185/185E to SIP 100
13.13 ft (4 m), 9-pin connector

79734 SIP 100 User's Manual

EPSON HX-20 Replaceable Ribbon Cartridge



Panel Mount Installation

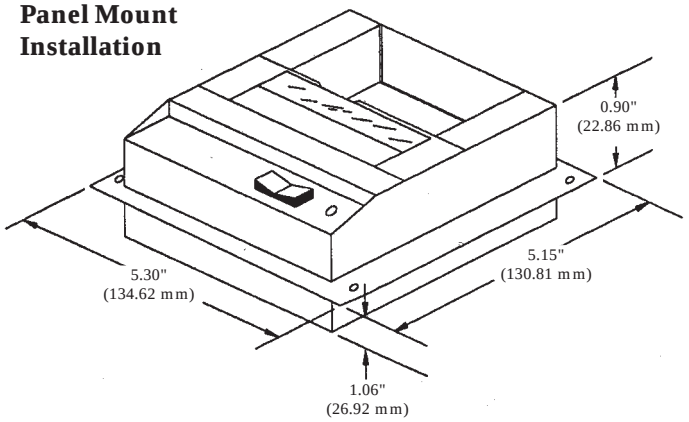
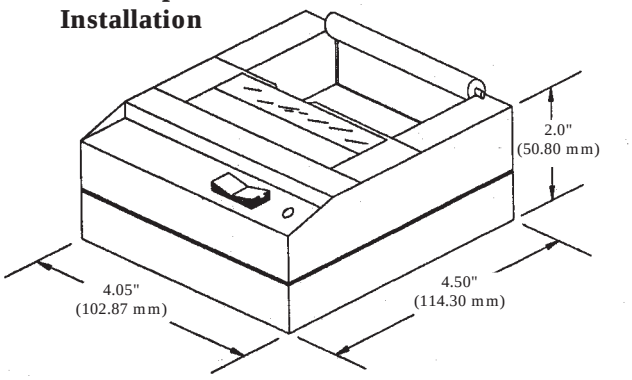


Table Top Installation



Remote Operator Station

Enables operator to remotely activate MODE, ENTER, and RESTART functions

Optionally, the PMD 3170, 3175, 3670, and 3675 Master Marquees can be operated via a remote operator station. This station is used to activate the switch inputs and provide a convenient connection for devices that are used on the Terminal/Printer Port.

Wiring connections can be reconfigured at the Remote Operator Station end. Please note that the Enable line is for MODE, ENTER, and RESTART pushbuttons on the processor board of the 3100/3600 units.

How to Order

A remote pushbutton station consists of two parts:

58263 Remote Operator Station:
(used with PMD 3170/3175, 3670/3675)

43424-xx

Remote Operator Station cable from the RS-232 Terminal/Printer Port on the 3100/3600 Master Marquee to the Remote Operator Station. To order, replace the xx with the digit for the proper length required.

Digit	Length ft. (m)
07	22.9 ft (7 m)
15	49.2 ft (15 m)
23	75.5 ft (23 m)
30	98.4 ft (30 m)

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PMD Accessories

How to Order

Cables:

43962 RS-232C (IBM PC to Uticor products), 3 meters (25- and 9-pin programming)

Plugs:

58373 230 VAC, 50 Hz European plug

58374 240 VAC, 50 Hz U.K. plug

PowerPanel Series

Touchscreen Operator Interfaces for Modbus and Modbus Plus

Features:

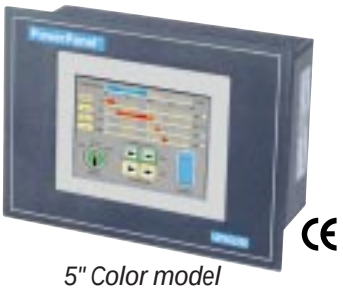
- **Bright displays make PowerPanels easier to read**
- **Wide viewing angles allow you to read screens from the side**
- **3-D real-feel operator controls**
- **16 different text sizes, from 1/8" to almost 1" high**
- **Metal housing with NEMA 4 or 4X rating, as standard**
- Unique **Drawing tools to draw application-specific objects**
- **On-line programming**
- **.DXF File Import to display drawings**
- **Line graphs for trending**
- **8 Passwords for added security**
- **Visual control panel design with ready-to-use panel components**
- Unique **Multiple language support for international market and non-English operators**
- Unique **High brightness model — 1500 NITs — readable in sunlight**

Introduction

PowerPanels from AVG Uticor are state-of-the-art, touchscreen, flat panel, graphical operator interfaces that allow you to talk to most major PLCs on the market today. The PowerPanels, with bright displays and wide viewing angles, allow you to replace your electro-mechanical panels inexpensively.

PowerPanels use the latest in color display technology. The high brightness of the display makes it easy to read in the varying light conditions encountered in a plant environment. The display's wider viewing angle allows operators to view the display from different directions. With text size up to 1" high, the display can be viewed from a distance.

The PowerPanel comes with ***free*** screen design software called uWIN. This easy-to-use software package allows you to quickly design your panel screens by simply picking and placing the most commonly used OBJECT (devices) from a floating TOOLBOX, and then filling in the associated properties for the object you selected. With PowerPanel, you are not limited to just the objects in the toolbox. For application-specific and/or not-so-common objects, uWIN provides a full set of drawing tools.



5" Color model 100G-5S1RO

User-friendly, uWIN helps you design the screens for the operator interface in the shortest possible time. In fact, you can design a typical screen in less than 10 minutes even if you have never used the software before!

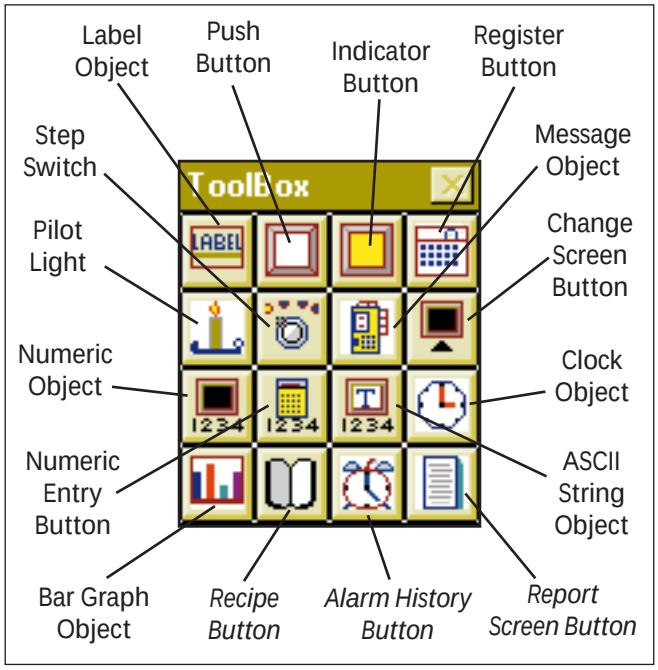
PowerPanel can be made far less cluttered by displaying only the necessary controls, and only when needed. This virtually eliminates operator error caused by actuating the wrong control. You can't, if it isn't there in the first place.

VARIETY OF MODELS TO CHOOSE FROM:

- **— 5" Monochrome LCD**
- **— 5" Color LCD**
- **— 6" Monochrome LCD**
- **— 8" Color LCD**
- **— 9" Amber EL**
- **— 10" Color LCD**
- **— 10" Active Matrix Color LCD**
- **— 10" High-Brite Color LCD**

READY-TO-USE DISPLAY OBJECTS

uWIN, the free Windows-based programming software comes with a toolbox of ready-to-use Panel objects or components.



With the floating TOOLBOX, designing a screen is as simple as 1-2-3.

1. Pick the desired object from the TOOLBOX, by left clicking your mouse on the object...
2. Place and size the object at the desired location on the screen; and...
3. Fill in the property dialog box for the object you have placed on the screen.

VERSATILE DATA ENTRY TOOLS

PowerPanel supports operator touchscreen entry of numeric or ASCII data. Built-in numeric format conversion (BCD, Hex, Octal, etc.), scaling, and range checking features allow operators to enter data in the format most familiar to them, while eliminating the need to use ladder logic for conversion.

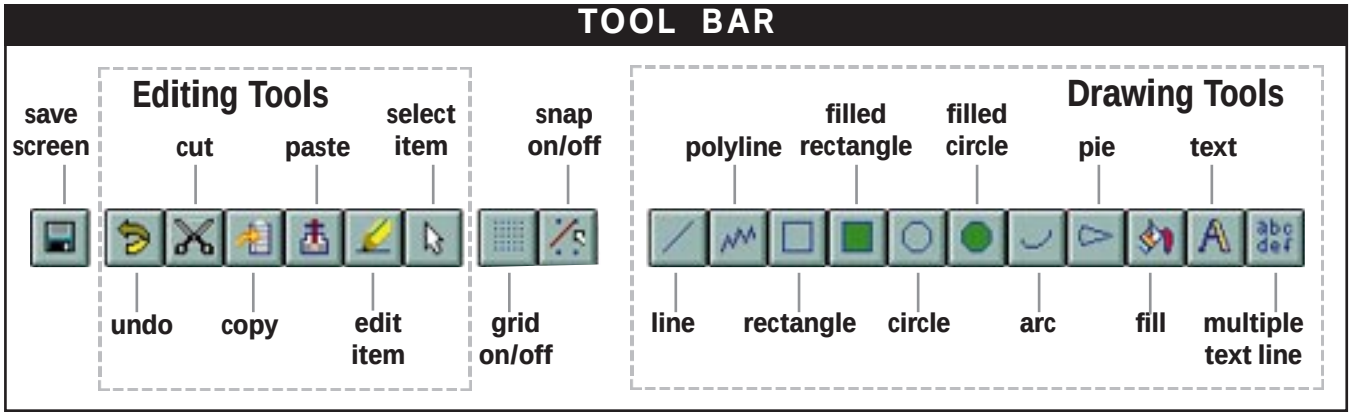
For example, if the machine being controlled only accepts Celsius temperature values in BCD, and the operator is more comfortable working with Fahrenheit temperatures. All the person programming the PowerPanel has to do is enter the Fahrenheit maximum and minimum values and corresponding Celsius maximum and minimum values and select "BCD" as the data type. PowerPanel will automatically convert operator entered values to °C. Range checking minimizes operator errors by rejecting data outside the preset limits.

PowerPanel has yet another unique feature: the touchscreen supports multiple "Enter" keys, allowing multiple data entry from a single screen keypad-eliminating the need for multiple screens or multiple keypads on one screen.

DRAWING TOOLS

Although the PowerPanel offers a toolbox of commonly used objects, some situations may require graphics not provided in the toolbox.

uWIN provides a set of drawing tools that let the user draw custom graphics on the screen. Drawing tools include line, polyline, rectangle, filled rectangle, circle, filled circle, arc, pie, fill, and text tools.



ON-LINE PROGRAMMING

Unique

uWIN software allows you to develop your screen On-Line or Off-Line. The On-Line mode is unique to PowerPanels! You can design/modify screens on a PowerPanel...while it's working...(i.e., connected to the PLC)! The advantage of the On-Line mode is that it allows you to see the effect of changes in screen design immediately, eliminating the traditional "edit-compile-download" cycle.

The Off-Line mode offers you the convenience of designing screens without having a PowerPanel connected to the PLC.

LIBRARY SCREENS

Library Screen feature of PowerPanel enables you to draw often used Panel components only once and save them in Library Screens. Once saved in a Library Screen, a component may be used any number of times on any number of screens, and can even be used in a new program. The Library Screen feature eliminates the need of redrawing a component. It also saves valuable memory space, as a Library Screen is stored only once, even though it is used in many screens.

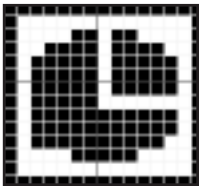
VARIETY OF TEXT SIZES

PowerPanels support 16 character sizes from 0.125" to almost 1" high, vertically or horizontally. In addition, characters can be selectively programmed to blink to draw the operator's attention.

LINE GRAPHS FOR TRENDING

PowerPanel supports Line Graphs. The graphs show variations of register values over periods of time or against bit transition. This is an excellent tool to visually display trending of process variables. Line graph screens can contain graphics, text, libraries, and symbols. Up to 20 process variables (register values) can be displayed on one screen at a time, and up to 999 line graph screens can be programmed. A maximum of 255 registers can be monitored.

SYMBOLS AND BITMAPS



uWIN allows the use of bit maps on the screens. These bit maps are usually used for small icons. Bit map images can be created in uWIN software. The maximum bit-map size supported is 96 x 96 pixels.

ALARMS

PowerPanel has powerful alarm capabilities. You can monitor alarms based on high or low setpoints. Up to 999 alarms, each up to 34 characters long, can be programmed. Each alarm is assigned to a group, and every group can have a maximum of 100 alarms. PowerPanel can monitor only one group of alarms at a time (up to a maximum of 10 groups) and keeps a history of the last 64 alarms for users to view and/or analyze. You can dynamically select the alarm group you want to monitor using your PLC.

You can program PowerPanels to monitor a discrete bit or register value to trigger an alarm.

When an alarm condition occurs, the programmed alarm message is displayed across the bottom of the PowerPanel's screen. If multiple alarms occur, the messages are placed in a circular queue and displayed in sequence. An alarm message can only be cleared when the alarm condition is cleared.

.DXF File Import

PowerPanels support import of .DXF files. This feature can be used to bring already-created drawings in the panel.

PowerPanels import the following elements: lines, polylines, circles, arc, text, trace, solid and block. If the drawing has any other element, it may not be imported. The converted drawing should fit within the per screen memory limit (4KB) of the PowerPanel. If the converted drawing takes more space, the drawing is not imported.

BARGRAPHS

Unlike electromechanical control panels, PowerPanel supports bargraphs, which represent numerical values in graphical form. Viewing bargraphs has advantages over numerical values in some situations. For example, bargraphs are easily visible from a distance. Typical applications of bargraphs include displaying process parameters, e.g., showing liquid levels in a tank.

MULTIPLE LANGUAGES Unique

PowerPanels offer a unique multiple languages feature. This feature is ideal for OEMs selling internationally, or in a multilingual market. For example it might be desirable to see a pushbutton labeled as “GOOD” for an English-speaking operator, but labeled as “BON” for a French speaking operator, or “BIEN” for a Spanish-speaking operator.

To use this feature, a user will design a screen as usual, and enter text strings, where applicable, in as many languages (up to 16) as desired. Unlike some other OIs, you do not have to design & maintain multiple programs for different languages. During operation, select the desired language from the setup screen. All text strings will be displayed in the selected language. PowerPanels support only the American English ASCII character set.

SECURITY—8 PASSWORDS

PowerPanels offers password protection to eliminate unauthorized access to screens. PowerPanel models offer up to 8 passwords allowing you to design a multilevel access control.

HIGH-BRIGHT MODEL PROVIDES OUTDOOR VISIBILITY Unique

Most LCD displays washout in bright ambient light such as sunlight. AVG Uticor offers a 10" model with a very bright backlight. With 1500 NITs, this Operator Interface can be used in very bright light including sunlight

Please note: The High-Bright unit generates a lot of heat. You may need to supply air cooling to operate the unit within its specified temperatures.

VARIETY OF PORTS

PowerPanels have a variety of communication ports to provide connectivity to a PLC and/or Computer. In some models, ports are provided for connection to a bar code reader/printer and/or to a Uticor-slave network. The Uticor slave network port allows you to connect to a variety of plant-wide communications devices.

5" color and 5" monochrome models offer only two ports, one for a computer and one for a PLC.

All other models offer 4 communication ports. In addition to PLC and computer ports, these models offer a port for bar code reader/printer and a port for the Uticor slave display network.

The computer port is available in RS-232C or RS-422A configurations. You may use either port to connect PowerPanel to your computer. The RS-422A port allows you to connect multiple PowerPanels to one computer. (The computer needs to be connected only for programming the PowerPanel.)

The PLC port on the PowerPanels supports RS-232C, RS-422A and RS-485A standards.

Panel Objects:

In PLC-based control, the PLC performs the following control sequence continuously: reads inputs, solves control logic (ladder logic problems), and set/reset outputs. The state of inputs and outputs is kept as bits in a data table. The data table is typically organized in words, with each word having 16 bits. Data values, such as parts count, are also kept as words in the data table.

PowerPanel provides direct access to the bits and words of the PLC data table, without going through the I/O modules. It provides this access through its internal registers. PowerPanel has 1024 internal registers that are mapped to the PLC data table. The mapping between PowerPanel registers and PLC data tables is user-defined through a simple dialog box. The Panel objects allow you to set/reset bits and to read/write from the PLC data table through PowerPanel's internal registers. For example, when a Pushbutton Panel Object is pressed, it sets a bit in a PowerPanel internal register. PowerPanel transfers this bit to the mapped bit in the PLC data table. Similarly, the PLC may set an output bit that turns on a pilot light on the PowerPanel.

Listed below are the OBJECTS available to you in the floating TOOLBOX along with a brief explanation of their functions.

LABEL OBJECT:

The LABEL OBJECT allows the user to insert or change text on the screen and surround it in a box or frame. This object provides a "package" for the user to create text, and indicate size, color, and borders, etc. The label can simulate a button image if desired, and/or can be used to display a header/footer, column heading, etc., on the screen.

PUSHBUTTON:

The PUSHBUTTON allows the user to perform a WRITE operation to a specific bit within an internal register. The PUSHBUTTON can be displayed in various colors, sizes, shapes and has a simulation option. Up to 7 types of PUSHBUTTON states are available:

- Momentary ON
- Momentary OFF
- Timed ON
- Timed OFF
- Set ON
- Set OFF
- TOGGLE

INDICATOR BUTTON:

The INDICATOR BUTTON is a compilation of a PUSHBUTTON and PILOT LIGHT. It allows the user to perform a WRITE operation to one bit and a READ to a second discrete location within a register. The state of that Read location determines whether the button is displayed in the ON or OFF mode. This button can also be displayed in different sizes, colors and shapes and has a simulation option.

As with the PUSHBUTTON, the INDICATOR BUTTON is available in 7 types:

- Momentary ON
- Momentary OFF
- Timed ON
- Timed OFF
- Set ON
- Set OFF
- TOGGLE

REGISTER BUTTON:

The REGISTER BUTTON allows the user to assign a value to a register or to perform a math/logic function with that value and the assigned register's current value.

PILOT LIGHT:

The PILOT LIGHT OBJECT allows the user to monitor and display the state of a bit. The PILOT LIGHT reads the bit information and produces the appropriate display. For example, the PILOT LIGHT could display the status of a bit linked to a PUSHBUTTON.

STEP SWITCH:

The STEP SWITCH OBJECT simulates a Mechanical Step Switch on the PowerPanel. It allows you to simultaneously monitor and control 2, 3, or 4 different bits and display ON and OFF text for each bit. Each time the user touches the STEP SWITCH on the screen, each bit will be cycled one at a time from OFF to ON with only one bit on at a time.

Panel Objects cont'd:

MESSAGE OBJECT:

The MESSAGE OBJECT allows the user to display a variety of stored messages and variable data sets within a frame on the Base Screen. These messages are displayed by monitoring a specific register or bit value.

CHANGE SCREEN BUTTON:

The CHANGE SCREEN OBJECT allows the user to change the PowerPanel screen being displayed by calling up a specific Base Screen and number. Otherwise, the Base Screen that immediately preceded the current screen can be displayed.

NUMERIC OBJECT:

The NUMERIC OBJECT allows the user to display and label a register value within a frame on the base screen.

NUMERIC ENTRY BUTTON:

The NUMERIC ENTRY BUTTON causes a keypad to be displayed which in turn allows the operator to assign a value to a specific register.

ALARM HISTORY BUTTON:

The ALARM HISTORY BUTTON, when pressed, brings up alarm history on the display.

RECIPE BUTTON:

The RECIPE BUTTON allows you to write preset values to up 20 registers in the PowerPanel. These values may then be transferred from PowerPanel Registers to PLC to change the process. Thus this feature can be used to download "recipes" to the PLC.

ASCII STRING OBJECT:

The ASCII STRING OBJECT allows the user to write messages and display them on the screen using an ASCII protocol.

A message will be displayed in ASCII characters according to the values read and stored in a designated block of internal registers.

CLOCK OBJECT:

The CLOCK OBJECT allows the user to display a real time clock showing the current date, time, or both.

The date and time are displayed in the following format:

Time/Date: HH:MM:SS / MM:DD:YY

BARGRAPH OBJECT:

The BARGRAPH OBJECT allows the user to monitor and display a register value in a bar graph form on the Base Screen.

The bargraph can be displayed in various formats. Moreover, they can be programmed to read from top to bottom, left to right, right to left, etc.

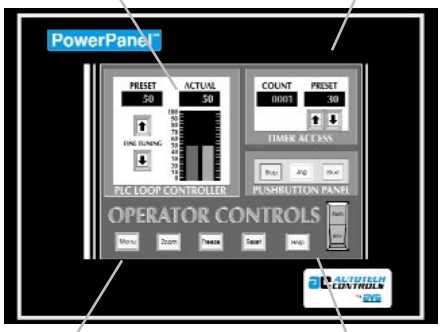
REPORT SCREEN BUTTON:

PowerPanels support a feature called report screens. Report screens can have a variety of data. Report screens can be displayed as well as printed (through AUX Port). Report screen button allows you to bring up a report screen on the display when the button is pressed.

5" Monochrome Model (Modbus - Only)

3 Levels of Gray

Enclosure: NEMA 4 metal housing



Touch Screen:
48 Resistive Touch cells (8x6)
(Can be used with gloves)

Wide Viewing Angle
H: -35 to 35 degrees
V: -30 to 15 degrees

320 x 240 Pixels

Unit Dimensions: (mm)
6.5" x 4.75" x 2.375"
(165.1) x (120.) x (60.3)

(Same size and mounting dimensions as QUICKPANEL jr.)

BACK VIEW

Power Supply terminals:
(24 VDC In)

Battery access

PLC port:
RS232, RS422, or RS485

Computer ports:
RS232 or RS422

BOTTOM VIEW

SPECIFICATIONS

INPUT POWER:
24 VDC nominal (21.6-32 VDC),
18 W, Fuse-0.75 A

DISPLAY TYPE:
4.6" Diagonal
Monochrome LCD

DISPLAY SIZE:
3.75" x 2.8" (95.3 x 71.1 mm)

DISPLAY BRIGHTNESS:
90 NITS

USER MEMORY:
256 Kbytes, battery backed up

BATTERY LIFE:
1 year, if unit is OFF
5 years, if unit is ON

REAL-TIME CLOCK:
Standard: +1, -2 min. per month error maximum

TEMPERATURE:
Operating:
32 to 113 °F (0 to +45 °C)
Storage:
-4 to +140 °F (-20 to +60 °C)

HUMIDITY:
10-95% R.H., noncondensing

ELECTRICAL NOISE TOLERANCE:
NEMA ICS2-230 showering arc,
ANSI C37.90a-1974 SWC Level C
Chattering Relay Test

BURN-IN:
All products are temperature cycled 96 hours and then are fully, functionally tested.

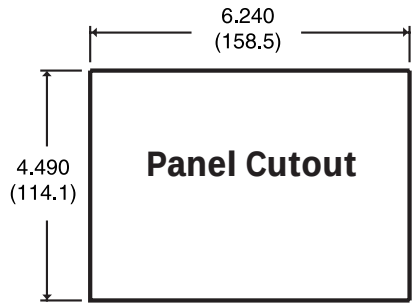
AGENCY APPROVALS:
UL/CSA Class 1, DIV.II compliant/CE

VIBRATION
Vertical Axis only
(normal installation position)
Frequency: 5 to 500 Hz
Sweep time: 11 min. (6 sweeps)
Amplitude: 1.000 in.
Maximum Acceleration: 1.5 g

SHOCK:
Vertical axis only (force down)
Acceleration: 40 g
Duration: 11 msec.
Waveform: Half sine wave
No. of impacts: 10

For ordering information see page 88

MOUNTING DIMENSIONS:



5" Color Model (Modbus & Modbus Plus)

Bright 16 color display

Enclosure: NEMA 4 metal housing

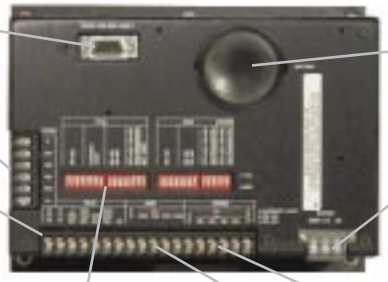
Touch Screen:
48 Resistive Touch cells (8x6)
(Can be used with gloves)

320 x 240 Pixels

Computer ports:
RS232
or
RS422

PLC port:
RS232, RS422,
or RS485

BACK VIEW:



Battery access

Power Supply terminals:
(24 VDC In)

DIP Switches to configure PLC port

AUX

COM2

Wide Viewing Angle
H: -35 to 25 degrees
V: -25 to 25 degrees

Unit Dimensions: (mm)
6.625" x 6.50" x 3.85"
(219.1) x (165.1) x (97.8)

SPECIFICATIONS

INPUT POWER:
24 VDC nominal (21.6-32 VDC),
18 W, Fuse-1.5 A

Display Type:
5.1" Diagonal
Color LCD Display, 16 colors

Display Size:
4.04" x 3.03" (102.6 x 77 mm)

Display Brightness:
150 NITS

User Memory:
256 Kbytes, battery backed up

Battery Life:
1 year, if unit is OFF
5 years, if unit is ON

Real-Time Clock:
Standard: +1, -2 min. per month error maximum

Temperature:
Operating:
32 to 122 °F (0 to +50 °C)
Storage:
-40 to +149 °F (-40 to +65 °C)

Humidity:
10-95% R.H., noncondensing

Electrical Noise Tolerance:
NEMA ICS2-230 showering arc,
ANSI C37.90a-1974 SWC Level C
Chattering Relay Test

Burn-In:
All products are temperature cycled 96 hours and then are fully, functionally tested.

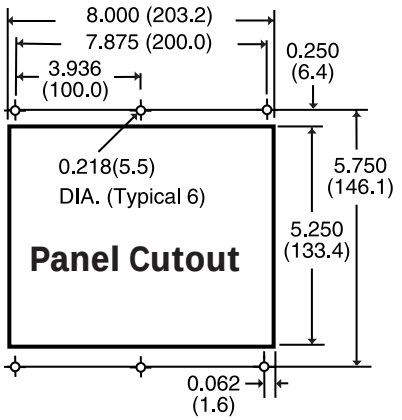
Agency Approvals:
UL/CSA Class 1, DIV.II compliant/CE

Vibration:
Vertical Axis only
(normal installation position)
Frequency: 5 to 500 Hz
Sweep time: 11 min. (6 sweeps)
Amplitude: 1.000 in.
Maximum Acceleration: 1.5 g

Shock:
Vertical axis only (force down)
Acceleration: 40 g
Duration: 11 msec.
Waveform: Half sine wave
No. of impacts: 10

For ordering information see page 88

MOUNTING DIMENSIONS:



6" Monochrome Model (Modbus & Modbus Plus)

3 Levels of Gray

Enclosure: NEMA 4 metal housing

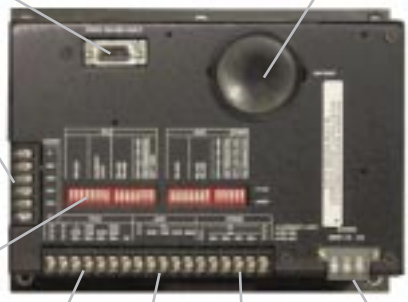
Touch Screen: 48 Resistive Touch cells (8x6) (Can be used with gloves)

320 x 240 Pixels

Wide Viewing Angle
H: -25 to +25 degrees
V: -10 to +20 degrees

Unit Dimensions: (mm)
8.62.5" x 6.5" x 3.5"
(219.0) x (165.1) x (88.9)

BACK VIEW



Computer ports: RS232 or RS422

Battery access

DIP Switches to configure PLC port

AUX **COM2**

PLC port: RS232, RS422, or RS485

Power Supply terminals: (24 VDC In)

SPECIFICATIONS

INPUT POWER:
24 VDC nominal (21.6-32 VDC), 12 W, Fuse-1.5 A

Display Type:
5.6" Diagonal, Monochrome LCD

Display Size:
4.7" x 3.5" (119.4 x 88.9)

Display Brightness:
60 NITS

User Memory:
256 Kbytes, battery backed up

Battery Life:
1 year, if unit is OFF
5 years, if unit is ON

Real-Time Clock:
Standard: +1, -2 min. per month error maximum

Temperatures:
Operating:
32 to +104 °F (0 to +40 °C)
Storage:
4 to +140 °F (-20 to +60 °C)

Humidity:
10-95% R.H., noncondensing

Electrical Noise Tolerance:
NEMA ICS2-230 showering arc, ANSI C37.90a-1974 SWC Level C Chattering Relay Test

Burn-In:
All products are temperature cycled 96 hours and then are fully, functionally tested.

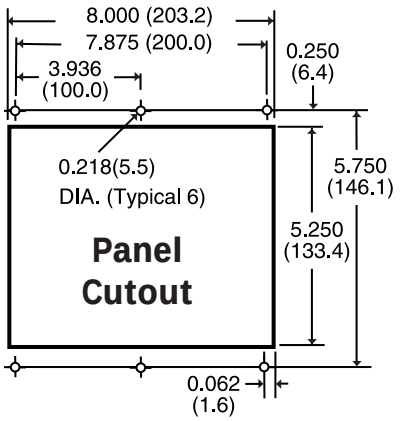
Agency Approvals:
UL/CSA Class 1, DIV.II compliant/CE

Vibration:
Vertical Axis only (normal installation position)
Frequency: 5 to 500 Hz
Sweep time: 11 min. (6 sweeps)
Amplitude: 1.000 in.
Maximum Acceleration: 1.5 g

Shock:
Vertical axis only (force down)
Acceleration: 40 g
Duration: 11 msec.
Waveform: Half sine wave
No. of impacts: 10

For ordering information see page 88

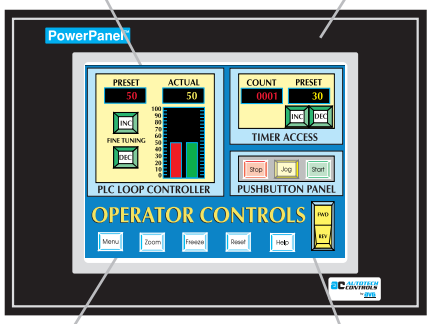
MOUNTING DIMENSIONS:



8" Color Model (Modbus & Modbus Plus)

Bright 16 Color Display

Enclosure: NEMA 4 metal housing



Touch Screen: 192 Resistive Touch cells (16x12) (Can be used with gloves)

640 x 480 Pixels

Wide Viewing Angle
H: -50 to +50 degrees
V: -30 to +40 degrees

Unit Dimensions: (mm)
10.51" x 7.63" x 4.0"
(276) x (193.8) x (101.6)

BACK VIEW

Battery access

Power Supply terminals: (24 VDC In)

Computer ports: RS232 or RS422

DIP Switches to configure PLC port

AUX **COM2**

PLC port: RS232, RS422, or RS485

SPECIFICATIONS

INPUT POWER:
24 VDC nominal (21.6-32 VDC),
24 W, Fuse-1.5 A

Display Type:
7.7" Diagonal,
Color STN LCD

Display Size:
6.315" x 4.768"
(160.4 x 121.1 mm)

Display Brightness:
150 NITS

User Memory:
256 Kbytes, battery backed up

Battery Life:
1 year, if unit is OFF
5 years, if unit is ON

Real-Time Clock:
Standard: +1, -2 min. per month error maximum

Temperatures:
Operating Temperature:
32 to 104 °F (0 to 40 °C)
Storage Temperature:
-4 to +140 °F (-20 to +60 °C)

Humidity:
10-85% R.H., noncondensing

Electrical Noise Tolerance:
NEMA ICS2-230 showering arc,
ANSI C37.90a-1974 SWC
Level C Chattering Relay Test

Burn-In:
All products are temperature cycled 96 hours and then are fully, functionally tested.

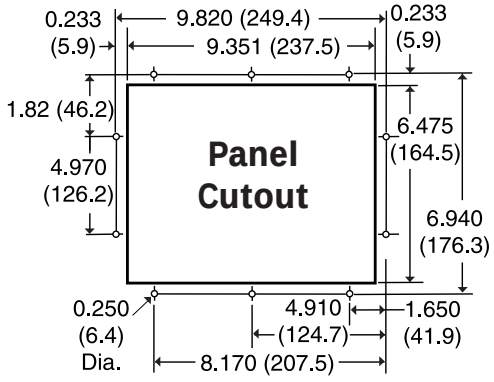
Agency Approvals:
UL/CSA Class 1, DIV.II compliant/CE

Vibration:
Vertical Axis only
(normal installation position)
Frequency: 5 to 500 Hz
Sweep time:
11 min. (6 sweeps)
Amplitude: 1.000 in.
Maximum Acceleration: 1.5 g

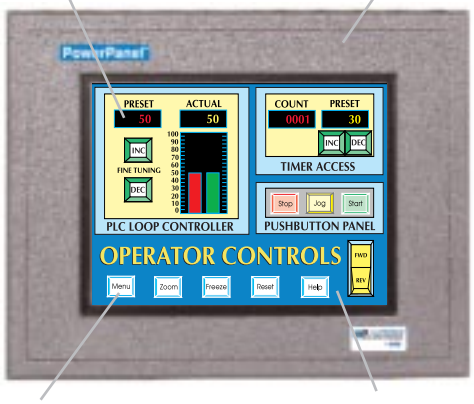
Shock:
Vertical axis only (force down)
Acceleration: 40 g
Duration: 11 msec.
Waveform: Half sine wave
No. of impacts: 10

For ordering information see page 88

MOUNTING DIMENSIONS:



9" EL Model (Modbus & Modbus Plus)



Wide Viewing Angle
H: -80 to +80 degrees
V: -80 to +80 degrees

Unit Dimensions: (mm)
11.24" x 8.36" x 4.2"
(285.5) x (212.3) x (106.7)

SPECIFICATIONS

Input Power:
115/230 VAC/DC, <40VA
Fuse-1A
(optional) 24VDC nominal
(21.6-32VDC), <40VA
Fuse-2A

Display Type:
9" Diagonal, Electroluminescent
Amber Display-3 Levels

Display Size:
7.7" x 4.8" (195.6 x 121.9)

Display Brightness:
115 NITS

User Memory:
256K or 512 Kbytes,
Battery-backed RAM or FLASH

Battery Life:
1 year, if unit is OFF
5 years, if unit is ON

Real-Time Clock:
Standard: +1, -2 min. per month error maximum

Temperatures:
Operating:
32 to 140 °F (0 to 60 °C)
Storage:
-40 to +167 °F (-40 to +75 °C)

Humidity:
10-95% R.H., noncondensing

Electrical Noise Tolerance:
NEMA ICS2-230 showering arc,
ANSI C37.90a-1974 SWC
Level C Chattering Relay Test

Burn-In:
All products are temperature cycled 96 hours and then are fully, functionally tested.

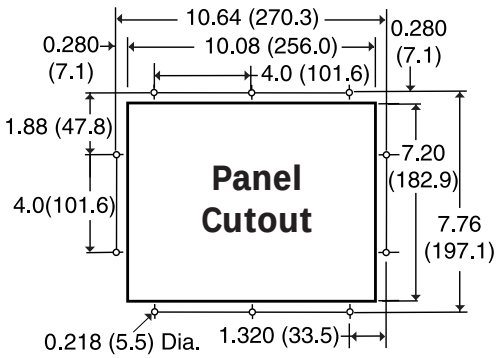
Agency Approvals:
UL/CSA Class 1, DIV.II compliant/CE

Vibration:
Vertical Axis only
(normal installation position)
Frequency: 5 to 500 Hz
Sweep time: 11 min. (6 sweeps)
Amplitude: 1.000 in.
Maximum Acceleration: 1.5 g

Shock:
Vertical axis only (force down)
Acceleration: 40 g
Duration: 11 msec.
Waveform: Half sine wave
No. of impacts: 10

For ordering information see page 89

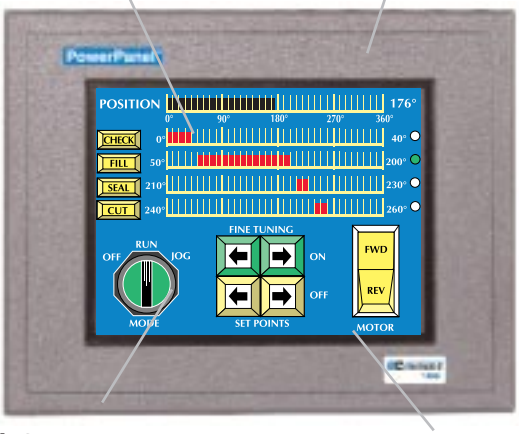
MOUNTING DIMENSIONS:



10" Color Model (Modbus & Modbus Plus)

Bright 16 Color Display

Enclosure: NEMA 4X metal housing



Touch Screen:
192 Resistive Touch cells (16x12)
(Can be used with gloves)

640 x 480 Pixels

Wide Viewing Angle
H: -35 to +50 degrees
V: -50 to +15 degrees

Unit Dimensions: (mm)
13.25" x 10.65" x 5.5"
(336.6) x (270.5) x (139.7)

BACK VIEW

DIP Switches to configure PLC port

Computer ports:
RS232
or
RS422

COM2

AUX

Power Supply terminals:

PLC port:
RS232, RS422, or RS485

SPECIFICATIONS

Input Power:
115/230 VAC/DC, <40VA
Fuse-1A
(optional) 24VDC nominal
(21.6-32VDC), <40VA
Fuse-1.5A

Display Type:
10.4" Diagonal,
16 Color Display

Display Size:
8.3" x 6.2" (210.8 x 157.5 mm)

Viewing Area:
51.46 in.2 (33,201 mm2)

Display Brightness:
150 NITS

User Memory:
256K or 512 Kbytes Battery-Backed RAM or FLASH

Battery Life:
1 year, if unit is OFF
5 years, if unit is ON

Real-Time Clock:
Standard: +30, -60 sec. per month error maximum

Temperatures:
Operating:
32 to 113 °F (0 to 45 °C)
Storage:
-4 to +140 °F (-20 to +60 °C)

Humidity:
10-95% R.H., noncondensing

Electrical Noise Tolerance:
NEMA ICS2-230 showering arc,
ANSI C37.90a-1974 SWC
Level C Chattering Relay Test

Burn-In:
All products are temperature cycled 96 hours and then are fully, functionally tested.

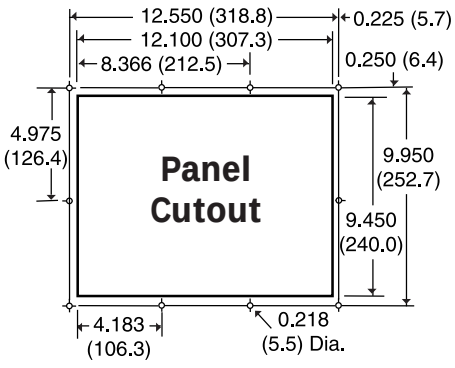
Agency Approvals:
UL/CSA Class 1, DIV.II compliant/CE

Vibration:
Vertical Axis only
(normal installation position)
Frequency: 5 to 500 Hz
Sweep time: 11 min. (6 sweeps)
Amplitude: 1.000 in.
Maximum Acceleration: 1.5 g

Shock:
Vertical axis only (force down)
Acceleration: 40 g
Duration: 11 msec.
Waveform: Half sine wave
No. of impacts: 10

For ordering information see page 89

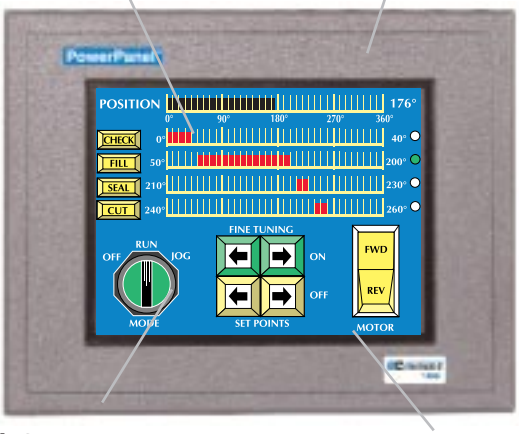
MOUNTING DIMENSIONS:



10" Active Matrix Color Model (Modbus & Modbus Plus)

Bright 16 Color Display

Enclosure: NEMA 4X metal housing



Touch Screen:
192 Resistive Touch cells (16x12)
(Can be used with gloves)

640 x 480 Pixels

Wide Viewing Angle
H: -35 to +50 degrees
V: -50 to +15 degrees

Unit Dimensions: (mm)
13.25" x 10.65" x 5.5"
(336.6) x (270.5) x (139.7)

BACK VIEW

DIP Switches to configure PLC port

Computer ports:
RS232
or
RS422

COM2

AUX

Power Supply terminals:

PLC port:
RS232, RS422, or RS485

SPECIFICATIONS

Input Power:
115/230 VAC/DC, <40VA
Fuse-1A
(optional) 24VDC nominal
(21.6-32VDC), <40VA
Fuse-1.5A

Display Type:
10.4" Diagonal,
16 Color Display

Display Size:
8.3" x 6.2" (210.8 x 157.5 mm)

Viewing Area:
51.46 in.2 (33,201 mm2)

Display Brightness:
200 NITS

User Memory:
256K or 512 Kbytes Battery-Backed RAM or FLASH

Battery Life:
1 year, if unit is OFF
5 years, if unit is ON

Real-Time Clock:
Standard: +30, -60 sec. per month error maximum

Temperatures:
Operating:
32 to 113 °F (0 to 45 °C)
Storage:
-4 to +140 °F (-20 to +60 °C)

Humidity:
10-95% R.H., noncondensing

Electrical Noise Tolerance:
NEMA ICS2-230 showering arc,
ANSI C37.90a-1974 SWC
Level C Chattering Relay Test

Burn-In:
All products are temperature cycled 96 hours and then are fully, functionally tested.

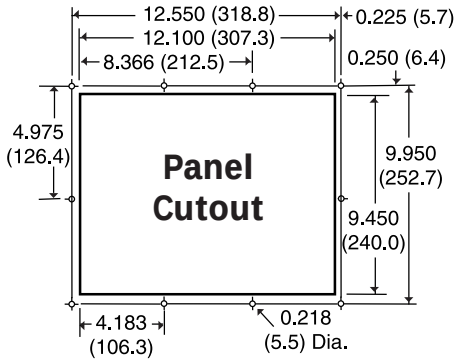
Agency Approvals:
UL/CSA Class 1, DIV.II compliant/CE

Vibration:
Vertical Axis only
(normal installation position)
Frequency: 5 to 500 Hz
Sweep time: 11 min. (6 sweeps)
Amplitude: 1.000 in.
Maximum Acceleration: 1.5 g

Shock:
Vertical axis only (force down)
Acceleration: 40 g
Duration: 11 msec.
Waveform: Half sine wave
No. of impacts: 10

For ordering information see page 90

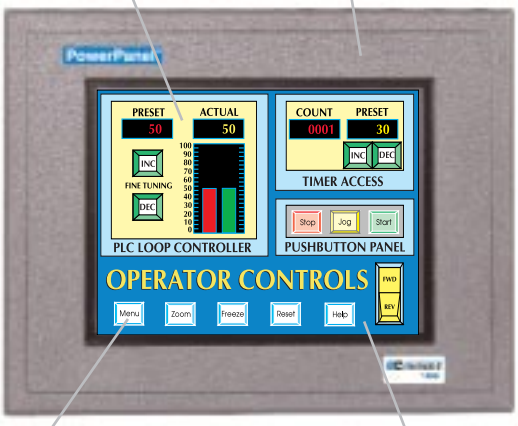
MOUNTING DIMENSIONS:



10" High-Bright Color Model (Modbus & Modbus Plus)

High-Bright 16 Color Display

Enclosure: NEMA 4x metal housing



Touch Screen:
192 Resistive Touch cells (16x12)
(Can be used with gloves)

640 x 480 Pixels

Wide Viewing Angle
H: -70 to +70 degrees
V: -40 to +70 degrees

Unit Dimensions: (mm)
13.25" x 10.65" x 5.5"
(336.6) x (270.5) x (139.7)

BACK VIEW

DIP Switches to configure PLC port

Computer ports:
RS232
or
RS422

COM2

AUX

Power Supply terminals:

PLC port:
RS232, RS422, or RS485

SPECIFICATIONS

Input Power:
115/230 VAC/DC, <65VA
Fuse-1.5A

Display Type:
10.4" Diagonal,
Color High-Bright Display

Display Size:
8.3" x 6.2" (210.8 x 157.5 mm)

Display Brightness:
1,500 NITS

User Memory:
256K or 512 Kbytes Battery-Backed RAM or FLASH

Battery Life:
1 year, if unit is OFF
5 years, if unit is ON

Real-Time Clock:
Standard: +30, -60 sec. per month error maximum

Temperatures:
Operating:
32 to 113 °F (0 to +45 °C)
Storage:
-4 to +140 °F (-20 to +60 °C)

Humidity:
10-95% R.H., noncondensing

Electrical Noise Tolerance:
NEMA ICS2-230 showering arc,
ANSI C37.90a-1974 SWC
Level C Chattering Relay Test

Burn-In:
All products are temperature cycled 96 hours and then are fully, functionally tested.

Agency Approvals:
UL/CSA Class 1, DIV.II compliant/CE

Vibration:
Vertical Axis only
(normal installation position)
Frequency: 5 to 500 Hz
Sweep time: 11 min. (6 sweeps)
Amplitude: 1.000 in.
Maximum Acceleration: 1.5 g

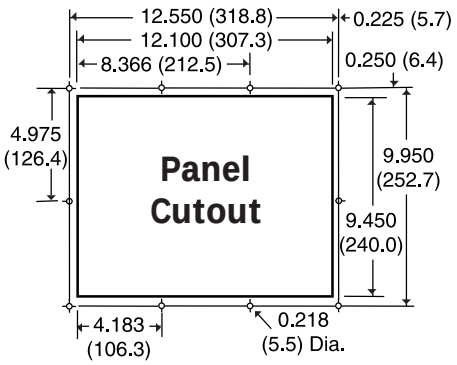
Shock:
Vertical axis only (force down)
Acceleration: 40 g
Duration: 11 msec.
Waveform: Half sine wave
No. of impacts: 10

CAUTION:

High-Bright unit generates a lot of heat causing temperature to rise. You may require air cooling to operate the unit within it's specified temperature.

For ordering information see page 90

MOUNTING DIMENSIONS:



PowerPanel Part Numbers

5" Monochrome Model

Part Number	Description
100G - 6B 1R	Enhanced feature 5" Monochrome LCD 3 Grey Levels, NEMA4 24VDC Input, 256K RAM Modbus - only

5" Color Model

Part Number	Description
100G - 5S 1R x	5" Color LCD, 16 Colors, NEMA4
1	24VDC Input, 256K RAM
1: PLC Interface Type:	Substitute for x from the following option list:
0	Modbus
4	Modbus Plus

6" Monochrome Model

Part Number	Description
100G - 5L 1R x	6" Monochrome LCD, 3 Grey Levels, NEMA4
1	24VDC Input, 256K RAM
1: PLC Interface Type:	Substitute for x from the following option list:
0	Modbus
4	Modbus Plus

8" Color Model

Part Number	Description
100G - 8S 1R x	8" Color LCD, 16 Colors, NEMA 4
1	24VDC Input, 256K RAM
1: PLC Interface Type:	Substitute for x from the following option list:
0	Modbus
4	Modbus Plus

PowerPanel Part Numbers **(cont.)**

9" EL Monochrome (Electroluminiscent) Model

Part Number		Description
100 x - x M xx x 1 2 3 4		9" EL Monochrome (Amber) NEMA4
1:	Bezel:	Substitute for x from the following option list:
	G	Standard Bezel
	SS	Stainless-Steel Bezel
2:	Input Voltage:	Substitute for x from the following option list:
	1	115/230 V AC/DC
	2	24 VDC Input
3:	Memory:	Substitute for xx from the following option list:
	1R	256K RAM
	2R	512K RAM
	1F	256K FLASH
	2F	512K FLASH
4:	PLC Interface Type:	Substitute for x from the following option list:
	0	Modbus
	4	Modbus Plus

10" Color LCD Model

Part Number		Description
100 x - x S xx x 1 2 3 4		10" Color, 16 Colors NEMA 4X
1:	Bezel:	Substitute for x from the following option list:
	G	Standard Bezel
	SS	Stainless-Steel Bezel
2:	Input Voltage:	Substitute for x from the following option list:
	1	115/230 V AC/DC
	2	24 VDC Input
3:	Memory:	Substitute for xx from the following option list:
	1R	256K RAM
	2R	512K RAM
	1F	256K FLASH
	2F	512K FLASH
4:	PLC Interface Type:	Substitute for x from the following option list:
	0	Modbus
	4	Modbus Plus

PowerPanel Part Numbers **(cont.)**

10" Active Matrix Color LCD Model

Part Number		Description
100 x - x xx x 1 2 3 4		10" Color, 16 Colors NEMA 4X, 115/230 V AC/DC
1:	Bezel:	Substitute for x from the following option list:
	G	Standard Bezel
	SS	Stainless-Steel Bezel
2:	Input Voltage:	Substitute for x from the following option list:
	1	115/230 V AC/DC input
	2	24 VDC input
3:	Memory:	Substitute for xx from the following option list:
	1R	256K RAM
	2R	512K RAM
	1F	256K FLASH
	2F	512K FLASH
4:	PLC Interface Type:	Substitute for x from the following option list:
	0	Modbus
	4	Modbus Plus

10" High-Bright Color LCD Model

Part Number		Description
100 x - 1 H xx x 1 2 3		10" Color, 16 Colors NEMA 4X, 115/230 V AC/DC
1:	Bezel:	Substitute for x from the following option list:
	G	Standard Bezel
	SS	Stainless-Steel Bezel
2:	Memory:	Substitute for xx from the following option list:
	1R	256K RAM
	2R	512K RAM
	1F	256K FLASH
	2F	512K FLASH
3:	PLC Interface Type:	Substitute for x from the following option list:
	0	Modbus
	4	Modbus Plus

PowerPanel Part Numbers **(cont.)**

PowerPanel Accessories

Cables:

43962	PowerPanel-to-computer programming cable
343117	25-Pin D Connector (female) Mating Connector for 5" Mono
72459	24 VDC Power Supply

PLC Interface Cables:

	5" Monochrome	All other models
AEG Series A120 (RS-232C)	**44378**	**44318**
Modbus (RS-232)	**44366**	**44312**

Batteries:

28417	Lithium 3.6 V Coin Cell (5" to 8" models)
28421	Lithium 3.6 V 1/2 AA (9" & 10" models)

Fuses:

2.0 A, 250 V, 2AG Slo-Blo (24 VDC Operation)

28105	5" & 6" models
28028	8" model
28113	9" & 10" models

1.0 A, 250 V, 2AG Slo-Blo (115 VAC Operation)

28421	9" & 10" models

Software:

10F64	uWIN Programming Software (Windows ver.)
79769	uWIN Software Manual

Protective Screen Overlay:

58457	9" EL Models
58461	All 10" Models

Keypad:

76845	External Keypad Module, 16 function keys and numeric keypad all 9" and 10" Models—only

Screen Backlight Replacement:

Call AVG Uticor Tech Support
1-800-TEC-ENGR (832-3647)
630-668-3900
FAX: 630-668-4676
www.avg.net

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